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# IRC®

## INTERNATIONAL RESIDENTIAL CODE® FOR ONE- AND TWO-FAMILY DWELLINGS



2009

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# PREFACE

## Introduction

Internationally, code officials recognize the need for a modern, up-to-date residential code addressing the design and construction of one- and two-family dwellings and townhouses. The *International Residential Code*®, in this 2009 edition, is designed to meet these needs through model code regulations that safeguard the public health and safety in all communities, large and small.

This comprehensive, stand-alone residential code establishes minimum regulations for one- and two-family dwellings and townhouses using prescriptive provisions. It is founded on broad-based principles that make possible the use of new materials and new building designs. This 2009 edition is fully compatible with all the *International Codes*® (I-Codes®) published by the International Code Council® (ICC)®, including the *International Building Code*®, *International Energy Conservation Code*®, *International Existing Building Code*®, *International Fire Code*®, *International Fuel Gas Code*®, *International Mechanical Code*®, *ICC Performance Code*®, *International Plumbing Code*®, *International Private Sewage Disposal Code*®, *International Property Maintenance Code*®, *International Wildland-Urban Interface Code*™ and *International Zoning Code*®.

The *International Residential Code* provisions provide many benefits, among which is the model code development process that offers an international forum for residential construction professionals to discuss prescriptive code requirements. This forum provides an excellent arena to debate proposed revisions. This model code also encourages international consistency in the application of provisions.

## Development

The first edition of the *International Residential Code* (2000) was the culmination of an effort initiated in 1996 by ICC and consisting of representatives from the three statutory members of the International Code Council at the time, including: Building Officials and Code Administrators International, Inc. (BOCA), International Conference of Building Officials (ICBO) and Southern Building Code Congress International (SBCCI), and representatives from the National Association of Home Builders (NAHB). The intent was to draft a stand-alone residential code consistent with and inclusive of the scope of the existing model codes. Technical content of the 1998 *International One- and Two-Family Dwelling Code* and the latest model codes promulgated by BOCA, ICBO, SBCCI and ICC was used as the basis for the development, followed by public hearings in 1998 and 1999 to consider proposed changes. This 2009 edition represents the code as originally issued, with changes reflected in the 2006 edition, and further changes developed through the ICC Code Development Process through 2008. Residential electrical provisions are based on the 2008 *National Electrical Code*® (NFPA 70). A new edition such as this is promulgated every three years.

Fuel gas provisions have been included through an agreement with the American Gas Association (AGA). Electrical provisions have been included through an agreement with the National Fire Protection Association (NFPA).

This code is founded on principles intended to establish provisions consistent with the scope of a residential code that adequately protects public health, safety and welfare; provisions that do not unnecessarily increase construction costs; provisions that do not restrict the use of new materials, products or methods of construction; and provisions that do not give preferential treatment to particular types or classes of materials, products or methods of construction.

## Adoption

The *International Residential Code* is available for adoption and use by jurisdictions internationally. Its use within a governmental jurisdiction is intended to be accomplished through adoption by reference in accordance with proceedings establishing the jurisdiction's laws. At the time of adoption, jurisdictions should insert the appropriate information in provisions requiring specific local information, such as the name of the adopting jurisdiction. These locations are shown in bracketed words in small capital letters in the code and in the sample ordinance. The sample adoption ordinance on page xiii addresses several key elements of a code adoption ordinance, including the information required for insertion into the code text.

## Maintenance

The *International Residential Code* is kept up-to-date through the review of proposed changes submitted by code enforcing officials, industry representatives, design professionals and other interested parties. Proposed changes are carefully considered through an open code development process in which all interested and affected parties may participate.

The contents of this work are subject to change both through the Code Development Cycles and the governmental body that enacts the code into law. For more information regarding the code development process, contact the Code and Standard Development Department of the International Code Council.

The maintenance process for the fuel gas provisions is based upon the process used to maintain the *International Fuel Gas Code*, in conjunction with the American Gas Association. The maintenance process for the electrical provisions is undertaken by the National Fire Protection Association.

While the development procedure of the *International Residential Code* assures the highest degree of care, ICC, the founding members of ICC, its members and those participating in the development of this code do not accept any liability resulting from compliance or noncompliance with the provisions because ICC and its founding members do not have the power or authority to police or enforce compliance with the contents of this code. Only the governmental body that enacts the code into law has such authority.

## Marginal Markings

Solid vertical lines in the margins within the body of the code indicate a technical change from the requirements of the 2006 edition. Deletion indicators in the form of an arrow (➡) are provided in the margin where an entire section, paragraph, exception or table has been deleted or an item in a list of items or a table has been deleted.

## Italicized Terms

Selected terms set forth in Chapter 2, Definitions, are italicized where they appear in code text. Such terms are not italicized where the definition set forth in Chapter 2 does not impart the intended meaning in the use of the term. The terms selected have definitions which the user should read carefully to facilitate better understanding of the code.

# Effective Use of the International Residential Code

The *International Residential Code*® (IRC®) was created to serve as a complete, comprehensive code regulating the construction of single-family houses, two-family houses (duplexes) and buildings consisting of three or more townhouse units. All buildings within the scope of the IRC are limited to three stories above grade plane. For example, a four-story single-family house would fall within the scope of the *International Building Code*® (IBC®), not the IRC. The benefits of devoting a separate code to residential construction include the fact that the user need not navigate through a multitude of code provisions that do not apply to residential construction in order to locate that which is applicable. A separate code also allows for residential and nonresidential code provisions to be distinct and tailored to the structures that fall within the appropriate code's scopes.

The IRC contains coverage for all components of a house or townhouse, including structural components, fireplaces and chimneys, thermal insulation, mechanical systems, fuel gas systems, plumbing systems and electrical systems.

The IRC is a prescriptive-oriented (specification) code with some examples of performance code language. It has been said that the IRC is the complete cookbook for residential construction. Section R301.1, for example, is written in performance language, but states that the prescriptive requirements of the code will achieve such performance.

It is important to understand that the IRC contains coverage for what is conventional and common in residential construction practice. While the IRC will provide all of the needed coverage for most residential construction, it might not address construction practices and systems that are atypical or rarely encountered in the industry. Sections such as R301.1.3, R301.2.2, R320.1, R322.1, N1101.2, M1301.1, G2401.1, P2601.1 and E3401.2 refer to other codes either as an alternative to the provisions of the IRC or where the IRC lacks coverage for a particular type of structure, design, system, appliance or method of construction. In other words, the IRC is meant to be all inclusive for typical residential construction and it relies on other codes only where alternatives are desired or where the code lacks coverage for the uncommon aspect of residential construction. Of course, the IRC constantly evolves to address new technologies and construction practices that were once uncommon, but now common.

The IRC is unique in that much of it, including Chapters 3 through 9 and Chapters 34 through 43, is presented in an ordered format that is consistent with the normal progression of construction, starting with the design phase and continuing through the final trim-out phase. This is consistent with the “cookbook” philosophy of the IRC.

The IRC is divided into eight main parts, specifically, Part I—Administration, Part II—Definitions, Part III—Building Planning and Construction, Part IV—Energy Conservation, Part V—Mechanical, Part VI—Fuel Gas, Part VII—Plumbing and Part VIII—Electrical.

The following provides a brief description of the content of each chapter and appendix of the IRC:

**Chapter 1 Scope and Administration.** This chapter contains provisions for the application, enforcement and administration of subsequent requirements of the code. In addition to establishing the scope of the code, Chapter 1 identifies which buildings and structures come under its purview. Chapter 1 is largely concerned with maintaining “due process of law” in enforcing the building criteria contained in the body of the code. Only through careful observation of the administrative provisions can the building official reasonably expect to demonstrate that “equal protection under the law” has been provided.

**Chapter 2 Definitions.** Terms defined in the code are listed alphabetically in Chapter 2. It is important to note that two chapters have their own definitions sections: Chapter 24 for the defined terms that are unique to fuel gas and Chapter 35 containing terms that are applicable to electrical Chapters 34 through 43. In the case where Chapter 2 and another chapter both define the same term differently, the definition found in Chapter 24 and/or 35 is intended to prevail where the term is used in Chapter 24 and/or 35 and the definition contained in Chapter 2 is intended to prevail where the term is used in all other locations in the code. Except where Chapter 24 or 35 has a definition that will prevail therein, the definitions in Chapter 2 are applicable throughout the code.

Additional definitions regarding skylights that are not listed in Chapter 2 are found in Section R308.6.1.

Where understanding a term's definition is key to or necessary for understanding a particular code provision, the term is shown in *italics* where it appears in the code. This is true only for those terms that have a meaning that is unique to the code. In other words, the generally understood meaning of a term or phrase might not be sufficient or consistent with the meaning prescribed by the code; therefore, it is essential that the code-defined meaning be known.

Guidance regarding not only tense, gender and plurality of defined terms, but also terms not defined in this code, is provided.

**Chapter 3 Building Planning.** Chapter 3 provides guidelines for a minimum level of structural integrity, life safety, fire safety and livability for inhabitants of dwelling units regulated by this code. Chapter 3 is a compilation of the code requirements specific to the building planning sector of the design and construction process. This chapter sets forth code requirements dealing with light, ventilation, sanitation, minimum room size, ceiling height and environmental comfort. Chapter 3 establishes life-safety provisions including limitations on glazing used in hazardous areas, specifications on stairways, use of guards at elevated surfaces and rules for means of egress. Snow, wind and seismic design and flood-resistant construction, as well as live and dead loads, are addressed in this chapter.

**Chapter 4 Foundations.** Chapter 4 provides the requirements for the design and construction of foundation systems for buildings regulated by this code. Provisions for seismic load, flood load and frost protection are contained in this chapter. A foundation system consists of two interdependent components: the foundation structure itself and the supporting soil.

The prescriptive provisions of this chapter provide requirements for constructing footings and walls for foundations of wood, masonry, concrete and precast concrete. In addition to a foundation's ability to support the required design loads, this chapter addresses several other factors that can affect foundation performance. These include controlling surface water and subsurface drainage, requiring soil tests where conditions warrant and evaluating proximity to slopes and minimum depth requirements. The chapter also provides requirements to minimize adverse effects of moisture, decay and pests in basements and crawl spaces.

**Chapter 5 Floors.** Chapter 5 provides the requirements for the design and construction of floor systems that will be capable of supporting minimum required design loads. This chapter covers four different types: wood floor framing, wood floors on the ground, cold-formed steel floor framing and concrete slabs on the ground. Allowable span tables are provided that greatly simplify the determination of joist, girder and sheathing sizes for raised floor systems of wood framing and cold-formed steel framing. This chapter also contains prescriptive requirements for attaching a deck to the main building.

**Chapter 6 Wall Construction.** Chapter 6 contains provisions that regulate the design and construction of walls. The wall construction covered in Chapter 6 consists of five different types: wood framed, cold-formed steel framed, masonry, concrete and structural insulated panel (SIP). The primary concern of this chapter is the structural integrity of wall construction and transfer of all imposed loads to the supporting structure. This chapter provides the requirements for the design and construction of wall systems that are capable of supporting the minimum design vertical loads (dead, live and snow loads) and lateral loads (wind or seismic loads). This chapter contains the prescriptive requirements for wall bracing and/or shear walls to resist the imposed lateral loads due to wind and seismic. Chapter 6 also contains requirements for the use of vapor retarders for moisture control in walls.

Chapter 6 also regulates exterior windows and doors installed in walls. The chapter contains criteria for the performance of exterior windows and doors and includes provisions for window sill height, testing and labeling, vehicular access doors, wind-borne debris protection and anchorage details.

**Chapter 7 Wall Covering.** Chapter 7 contains provisions for the design and construction of interior and exterior wall coverings. This chapter establishes the various types of materials, materials standards and methods of application permitted for use as interior coverings, including interior plaster, gypsum board, ceramic tile, wood veneer paneling, hardboard paneling, wood shakes and wood shingles.

Exterior wall coverings provide the weather-resistant exterior envelope that protects the building's interior from the elements. Chapter 7 provides the requirements for wind resistance and water-resistive barrier for exterior wall coverings. This chapter prescribes the exterior wall coverings as well as the water-resistive barrier required beneath the exterior materials. Exterior wall coverings regulated by this section include aluminum, stone and masonry veneer, wood, hardboard, particleboard, wood structural panel siding, wood shakes and shingles, exterior plaster, steel, vinyl, fiber cement and exterior insulation finish systems.

**Chapter 8 Roof-ceiling Construction.** Chapter 8 regulates the design and construction of roof-ceiling systems. This chapter contains two roof-ceiling framing systems: wood framing and cold-formed steel framing. Allowable span tables are provided to simplify the selection of rafter and ceiling joist size for wood roof framing and cold-formed steel framing. Chapter 8 also provides requirements for the application of ceiling finishes, the proper ventilation of concealed spaces in roofs (e.g., enclosed attics and rafter spaces), unvented attic assemblies, attic access and the proper clearance of combustible insulation from heat-producing devices.

**Chapter 9 Roof Assemblies.** Chapter 9 regulates the design and construction of roof assemblies. A roof assembly includes the roof deck, vapor retarder, substrate or thermal barrier, insulation, vapor retarder and roof covering. This chapter provides the requirement for wind resistance of roof coverings.

The types of roof covering materials and installation regulated by Chapter 9 are: asphalt shingles, clay and concrete tile, metal roof shingles, mineral-surfaced roll roofing, slate and slate-type shingles, wood shakes and shingles, built-up roofs, metal roof panels, modified bitumen roofing, thermoset and thermoplastic single-ply roofing, sprayed polyurethane foam roofing and liquid applied coatings. Chapter 9 also provides requirements for roof drainage, flashing, above deck thermal insulation and recovering or replacing an existing roof covering.

**Chapter 10 Chimneys and Fireplaces.** Chapter 10 contains requirements for the safe construction of masonry chimneys and fireplaces and establishes the standards for the use and installation of factory-built chimneys, fireplaces and masonry heaters. Chimneys and fireplaces constructed of masonry rely on prescriptive requirements for the details of their construction; the factory-built type relies on the listing and labeling method of approval. Chapter 10 provides the requirements for seismic reinforcing and anchorage of masonry fireplaces and chimneys.

**Chapter 11 Energy Efficiency.** Chapter 11 contains the energy-efficiency-related requirements for the design and construction of buildings regulated under this code. The applicable portions of the building must comply with the provisions within this chapter for energy efficiency. This chapter defines requirements for the portions of the building and building systems that impact energy use in new construction and promotes the effective use of energy. The provisions within the chapter promote energy efficiency in the building envelope, the heating and cooling system, the service water heating system and the lighting system of the building. This chapter also provides energy efficiency requirements for snow melt systems and pool heaters.

**Chapter 12 Mechanical Administration.** Chapter 12 establishes the limits of applicability of the code and describes how the code is to be applied and enforced. A mechanical code, like any other code, is intended to be adopted as a legally enforceable document and it cannot be effective without adequate provisions for its administration and enforcement. The provisions of Chapter 12 establish the authority and duties of the code official appointed by the jurisdiction having authority and also establish the rights and privileges of the design professional, contractor and property owner. It also relates this chapter to the administrative provisions in Chapter 1.

**Chapter 13 General Mechanical System Requirements.** Chapter 13 contains broadly applicable requirements related to appliance listing and labeling, appliance location and installation, appliance and systems access, protection of structural elements and clearances to combustibles, among others.

**Chapter 14 Heating and Cooling Equipment.** Chapter 14 is a collection of requirements for various heating and cooling appliances, dedicated to single topics by section. The common theme is that all of these types of appliances use energy in one form or another, and the improper installation of such appliances would present a hazard to the occupants of the dwellings, due to either the potential for fire or the accidental release of refrigerants. Both situations are undesirable in dwellings that are covered by this code.

**Chapter 15 Exhaust Systems.** Chapter 15 is a compilation of code requirements related to residential exhaust systems, including kitchens and bathrooms, clothes dryers and range hoods. The code regulates the materials used for constructing and installing such duct systems. Air brought into the building for ventilation, combustion or makeup purposes is protected from contamination by the provisions found in this chapter.

**Chapter 16 Duct Systems.** Chapter 16 provides requirements for the installation of ducts for supply, return and exhaust air systems. This chapter contains no information on the design of these systems from the standpoint of air movement, but is concerned with the structural integrity of the systems and the overall impact of the systems on the fire-safety performance of the building. This chapter regulates the materials and methods of construction which affect the performance of the entire air distribution system.

**Chapter 17 Combustion Air.** Complete combustion of solid and liquid fuel is essential for the proper operation of appliances, control of harmful emissions and achieving maximum fuel efficiency. If insufficient quantities of oxygen are supplied, the combustion process will be incomplete, creating dangerous byproducts and wasting energy in the form of unburned fuel (hydrocarbons). The byproducts of incomplete combustion are poisonous, corrosive and combustible, and can cause serious appliance or equipment malfunctions that pose fire or explosion hazards.

The combustion air provisions in this code from previous editions have been deleted from Chapter 17 in favor of a single section that directs the user to NFPA 31 for oil-fired appliance combustion air requirements and the manufacturer's installation instructions for solid fuel-burning appliances. If fuel gas appliances are used, the provisions of Chapter 24 must be followed.

**Chapter 18 Chimneys and Vents.** Chapter 18 regulates the design, construction, installation, maintenance, repair and approval of chimneys, vents and their connections to fuel-burning appliances. A properly designed chimney or vent system is needed to conduct the flue gases produced by a fuel-burning appliance to the outdoors. The provisions of this chapter are intended to minimize the hazards associated with high temperatures and potentially toxic and corrosive combustion gases. This chapter addresses factory-built and masonry chimneys, vents and venting systems used to vent oil-fired and solid fuel-burning appliances.

**Chapter 19 Special Fuel-burning Equipment.** Chapter 19 regulates the installation of fuel-burning appliances that are not covered in other chapters, such as ranges and ovens, sauna heaters, fuel cell power plants and hydrogen systems. Because the subjects in this chapter do not contain the volume of text necessary to warrant individual chapters, they have been combined into a single chapter. The only commonality is that the subjects use energy to perform some task or function. The intent is to provide a reasonable level of protection for the occupants of the dwelling.

**Chapter 20 Boilers and Water Heaters.** Chapter 20 regulates the installation of boilers and water heaters. Its purpose is to protect the occupants of the dwelling from the potential hazards associated with such appliances. A water heater is any appliance that heats potable water and supplies it to the plumbing hot water distribution system. A boiler either heats water or generates steam for space heating and is generally a closed system.

**Chapter 21 Hydronic Piping.** Hydronic piping includes piping, fittings and valves used in building space conditioning systems. Applications include hot water, chilled water, steam, steam condensate, brines and water/antifreeze mixtures. Chapter 21 regulates installation, alteration and repair of all hydronic piping systems to insure the reliability, serviceability, energy efficiency and safety of such systems.

**Chapter 22 Special Piping and Storage Systems.** Chapter 22 regulates the design and installation of fuel oil storage and piping systems. The regulations include reference to construction standards for above-ground and underground storage tanks, material standards for piping systems (both above-ground and underground) and extensive requirements for the proper assembly of system piping and components. The purpose of this chapter is to prevent fires, leaks and spills involving fuel oil storage and piping systems, whether inside or outside structures and above or underground.

**Chapter 23 Solar Systems.** Chapter 23 contains requirements for the construction, alteration and repair of all systems and components of solar energy systems used for space heating or cooling, and domestic hot water heating or processing. The provisions of this chapter are limited to those necessary to achieve installations that are relatively hazard free.

A solar energy system can be designed to handle 100 percent of the energy load of a building, although this is rarely accomplished. Because solar energy is a low-intensity energy source and dependent on the weather, it is usually necessary to supplement a solar energy system with traditional energy sources.

As our world strives to find alternate means of producing power for the future, the requirements of this chapter will become more and more important over time.

**Chapter 24 Fuel Gas.** Chapter 24 regulates the design and installation of fuel gas distribution piping and systems, appliances, appliance venting systems and combustion air provisions. The definition of “Fuel gas” includes natural, liquefied petroleum and manufactured gases and mixtures of these gases.

The purpose of this chapter is to establish the minimum acceptable level of safety and to protect life and property from the potential dangers associated with the storage, distribution and use of fuel gases and the byproducts of combustion of such fuels. This code also protects the personnel who install, maintain, service and replace the systems and appliances addressed herein.

Chapter 24 is composed entirely of text extracted from the IFGC; therefore, whether using the IFGC or the IRC, the fuel gas provisions will be identical. Note that to avoid the potential for confusion and conflicting definitions, Chapter 24 has its own definition section.

**Chapter 25 Plumbing Administration.** The requirements of Chapter 25 do not supersede the administrative provisions of Chapter 1. Rather, the administrative guidelines of Chapter 25 pertain to plumbing installations that are best referenced and located within the plumbing chapters. This chapter addresses how to apply the plumbing provisions of this code to specific types or phases of construction. This chapter also outlines the responsibilities of the applicant, installer and inspector with regard to testing plumbing installations.

**Chapter 26 General Plumbing Requirements.** The content of Chapter 26 is often referred to as “miscellaneous,” rather than general plumbing requirements. This is the only chapter of the plumbing chapters of the code whose requirements do not interrelate. If a requirement cannot be located in another plumbing chapter, it should be located in this chapter. Chapter 26 contains safety requirements for the installation of plumbing systems and includes requirements for the identification of pipe, pipe fittings, traps, fixtures, materials and devices used in plumbing systems. If specific provisions do not demand that a requirement be located in another chapter, the requirement is located in this chapter.

**Chapter 27 Plumbing Fixtures.** Chapter 27 requires fixtures to be of the proper type, approved for the purpose intended and installed properly to promote usability and safe, sanitary conditions. This chapter regulates the quality of fixtures and faucets by requiring those items to comply with nationally recognized standards. Because fixtures must be properly installed so that they are usable by the occupants of the building, this chapter contains the requirements for the installation of fixtures.

**Chapter 28 Water Heaters.** Chapter 28 regulates the design, approval and installation of water heaters and related safety devices. The intent is to minimize the hazards associated with the installation and operation of water heaters. Although this chapter does not regulate the size of a water heater, it does regulate all other aspects of the water heater installation such as temperature and pressure relief valves, safety drip pans and connections. Where a water heater also supplies water for space heating, this chapter regulates the maximum water temperature supplied to the water distribution system.

**Chapter 29 Water Supply and Distribution.** This chapter regulates the supply of potable water from both public and individual sources to every fixture and outlet so that it remains potable and uncontaminated by cross connections. Chapter 29 also regulates the design of the water distribution system, which will allow fixtures to function properly. Because it is critical that the potable water supply system remain free of actual or potential sanitary hazards, this chapter has the requirements for providing backflow protection devices.

**Chapter 30 Sanitary Drainage.** The purpose of Chapter 30 is to regulate the materials, design and installation of sanitary drainage piping systems as well as the connections made to the system. The intent is to design and install sanitary drainage systems that will function reliably, are neither undersized nor oversized and are constructed from materials, fittings and connections whose quality is regulated by this section. This chapter addresses the proper use of fittings for directing the flow into and within the sanitary drain piping system. Materials and provisions necessary for servicing the drainage system are also included in this chapter.

**Chapter 31 Vents.** Venting protects the trap seal of each trap. The vents are designed to limit differential pressures at each trap to 1 inch of water column (249 Pa). Because waste flow in the drainage system creates pressure fluctuations that can negatively affect traps, the sanitary drainage system must have a properly designed venting system. Chapter 31 covers the requirements for vents and venting. All of the provisions set forth in this chapter are intended to limit the pressure differentials in the drainage system to a maximum of 1 inch of water column (249 Pa) above or below atmospheric pressure (i.e., positive or negative pressures).

**Chapter 32 Traps.** Traps prevent sewer gas from escaping from the drainage piping into the building. Water seal traps are the simplest and most reliable means of preventing sewer gas from entering the interior environment. This chapter lists prohibited trap types as well as specifies the minimum trap size for each type of fixture.

**Chapter 33 Storm Drainage.** Rainwater infiltration into the ground adjacent to a building can cause the interior of foundation walls to become wet. The installation of a subsoil drainage system prevents the build-up of rainwater on the exterior of the foundation.

tion walls. This chapter provides the specifications for subsoil drain piping. Where the discharge of the subsoil drain system is to a sump, this chapter also provides coverage for for sump construction, pumps and discharge piping.

**Chapter 34 General Requirements.** This chapter contains broadly applicable, general and miscellaneous requirements including scope, listing and labeling, equipment locations and clearances for conductor materials and connections and conductor identification.

**Chapter 35 Electrical Definitions.** Chapter 35 is the repository of the definitions of terms used in the body of Part VIII of the code. To avoid the potential for confusion and conflicting definitions, Part VIII, Electrical, has its own definition chapter.

Codes are technical documents and every word, term and punctuation mark can impact the meaning of the code text and the intended results. The code often uses terms that have a unique meaning in the code, which can differ substantially from the ordinarily understood meaning of the term as used outside of the code.

The terms defined in Chapter 35 are deemed to be of prime importance in establishing the meaning and intent of the electrical code text that uses the terms. The user of the code should be familiar with and consult this chapter because the definitions are essential to the correct interpretation of the code and because the user may not be aware that a term is defined.

**Chapter 36 Services.** This chapter covers the design, sizing and installation of the building's electrical service equipment and grounding electrode system. It includes an easy-to-use load calculation method and service conductor sizing table. The electrical service is generally the first part of the electrical system to be designed and installed.

**Chapter 37 Branch Circuit and Feeder Requirements.** Chapter 37 addresses the requirements for designing the power distribution system which consists of feeders and branch circuits emanating from the service equipment. This chapter dictates the ratings of circuits and the allowable loads, the number and types of branch circuits required, the wire sizing for such branch circuits and feeders and the requirements for protection from overcurrent for conductors. A load calculation method specific to feeders is also included. This chapter is used to design the electrical system on the load side of the service.

**Chapter 38 Wiring Methods.** Chapter 38 specifies the allowable wiring methods, such as cable, conduit and raceway systems, and provides the installation requirements for the wiring methods. This chapter is primarily applicable to the "rough-in" phase of construction.

**Chapter 39 Power and Lighting Distribution.** This chapter mostly contains installation requirements for the wiring that serves the lighting outlets, receptacle outlets, appliances and switches located throughout the building. The required distribution and spacing of receptacle outlets and lighting outlets is prescribed in this chapter, as well as the requirements for ground-fault and arc-fault circuit interrupter protection.

**Chapter 40 Devices and Luminaires.** This chapter focuses on the devices, including switches and receptacles, and lighting fixtures that are typically installed during the final phase of construction.

**Chapter 41 Appliance Installation.** Chapter 41 addresses the installation of appliances including HVAC appliances, water heaters, fixed space-heating equipment, dishwashers, garbage disposals, range hoods and suspended paddle fans.

**Chapter 42 Swimming Pools.** This chapter covers the electrical installation requirements for swimming pools, storable swimming pools, wading pools, decorative pools, fountains, hot tubs, spas and hydromassage bathtubs. The allowable wiring methods are specified along with the required clearances between electrical system components and pools, spas and tubs. This chapter includes the special grounding requirements related to pools, spas and tubs, and also prescribes the equipotential bonding requirements that are unique to pools, spas and tubs.

**Chapter 43 Class 2 Remote-control, Signaling and Power-limited Circuits.** This chapter covers the power supplies, wiring methods and installation requirements for the Class 2 circuits found in dwellings. Such circuits include thermostat wiring, alarm systems, security systems, automated control systems and doorbell systems.

**Chapter 44 Referenced Standards.** The code contains numerous references to standards that are used to regulate materials and methods of construction. Chapter 44 contains a comprehensive list of all standards that are referenced in the code. The standards are part of the code to the extent of the reference to the standard. Compliance with the referenced standard is necessary for compliance with this code. By providing specifically adopted standards, the construction and installation requirements necessary for compliance with the code can be readily determined. The basis for code compliance is, therefore, established and available on an equal basis to the code official, contractor, designer and owner.

Chapter 44 is organized in a manner that makes it easy to locate specific standards. It lists all of the referenced standards, alphabetically, by acronym of the promulgating agency of the standard. Each agency's standards are then listed in either alphabetical or numeric order based upon the standard identification. The list also contains the title of the standard; the edition (date) of the standard referenced; any addenda included as part of the ICC adoption; and the section or sections of this code that reference the standard.

**Appendix A Sizing and Capacities of Gas Piping.** This appendix is informative and not part of the code. It provides design guidance, useful facts and data and multiple examples of how to apply the sizing tables and sizing methodologies of Chapter 24.

**Appendix B Sizing of Venting Systems Serving Appliances Equipped with Draft Hoods, Category I Appliances and Appliances Listed for Use with Type B Vents.** This appendix is informative and not part of the code. It contains multiple examples of how to apply the vent and chimney tables and methodologies of Chapter 24.

**Appendix C Exit Terminals of Mechanical Draft and Direct-venting Systems.** This appendix is informative and not part of the code. It consists of a figure and notes that visually depict code requirements from Chapter 24 for vent terminals with respect to the openings found in building exterior walls.

**Appendix D Recommended Procedure for Safety Inspection of an Existing Appliance Installation.** This appendix is informative and not part of the code. It provides recommended procedures for testing and inspecting an appliance installation to determine if the installation is operating safely and if the appliance is in a safe condition.

**Appendix E Manufactured Housing Used as Dwellings.** The criteria for the construction of manufactured homes are governed by the National Manufactured Housing Construction and Safety Act. While this act may seem to cover the bulk of the construction of manufactured housing, it does not cover those areas related to the placement of the housing on the property. The provisions of Appendix E are not applicable to the design and construction of manufactured homes. Appendix E provides a complete set of regulations in conjunction with federal law for the installation of manufactured housing. This appendix also contains provisions for existing manufactured home installations.

**Appendix F Radon Control Methods.** Radon comes from the natural (radioactive) decay of the element radium in soil, rock and water and finds its way into the air. Appendix F contains requirements to mitigate the transfer of radon gases from the soil into the dwelling. The provisions of this appendix regulate the design and construction of radon-resistant measures intended to reduce the entry of radon gases into the living space of residential buildings.

**Appendix G Swimming Pool, Spas and Hot Tubs.** Appendix G provides the regulations for swimming pools, hot tubs and spas installed in or on the lot of a one- or two-family dwelling. This appendix contains provisions for an effective barrier surrounding the water area and entrapment protection for suction outlets to reduce the potential for drowning of young children.

**Appendix H Patio Covers.** Appendix H sets forth the regulations and limitations for patio covers. The provisions address those uses permitted in patio cover structures, the minimum design loads to be assigned for structural purposes, and the effect of the patio cover on egress and emergency escape or rescue from sleeping rooms. This appendix also contains the special provisions for aluminum screen enclosures in hurricane-prone regions.

**Appendix I Private Sewage Disposal.**

**Appendix J Existing Buildings and Structures.** Appendix J contains the provisions for the repair, renovation, alteration and reconstruction of existing buildings and structures that are within the scope of this code. To accomplish this objective and to make the rehabilitation process more available, this appendix allows for a controlled departure from full code compliance without compromising minimum life safety, fire safety, structural and environmental features of the rehabilitated existing building or structure.

**Appendix K Sound Transmission.** Appendix K regulates the sound transmission of wall and floor-ceiling assemblies separating dwelling units and townhouse units. Air-borne sound insulation is required for walls. Air-borne sound insulation and impact sound insulation are required for floor-ceiling assemblies. The provisions in Appendix K set forth a minimum Sound Transmission Class (STC) rating for common walls and floor-ceiling assemblies between dwelling units. In addition, a minimum Impact Insulation Class (IIC) rating is also established to limit structure-borne sound through common floor-ceiling assemblies separating dwelling units.

**Appendix L Permit Fees.** Appendix L provides guidance to jurisdictions for setting appropriate permit fees. This appendix will aid many jurisdictions to assess permit fees that will assist to fairly and properly administer the code. This appendix can be used for informational purposes only or may be adopted when specifically referenced in the adopting ordinance.

**Appendix M Home Day Care—R3 Occupancy.** Appendix M provides means of egress and smoke detection requirements for a Group R-3 Occupancy that is to be used as a home day care for more than five children who receive custodial care for less than 24 hours. This appendix is strictly for guidance and/or adoption by those jurisdictions that have Licensed Home Care Provider laws and statutes that allow more than five children to be cared for in a person's home. When a jurisdiction adopts this appendix, the provisions for day care and child care facilities in the IBC should be considered also.

**Appendix N Venting Methods.** Because venting of sanitary drainage systems is perhaps the most difficult concept to understand, and Chapter 31 uses only words to describe venting requirements, illustrations can offer greater insight into what the words mean. Appendix N has a number of illustrations for commonly installed sanitary drainage systems in order for the reader to gain a better understanding of this code's venting requirements.

**Appendix O Gray Water Recycling Systems.** Appendix O offers a method for utilizing gray water that is collected from certain fixtures such as lavatories, bathtubs, showers and clothes washing machines. Because many geographical areas of the world are in short supply of water resources, water that has already passed through these fixtures is an important resource that can lessen the demand for potable water. Where gray water is used for underground irrigation, no treatment other than basic filtering is required. In this application, gray water reuse offers savings in both potable water use and less wastewater to be treated. Gray water can also be reused for flushing water for water closets and urinals. In this application, the gray water requires disinfection and coloring in order

to be safe for use in those fixtures. This appendix provides the user with basic information to choose the necessary components, size and construct a gray water system that suits the particular application.

**Appendix P Sizing of Water Piping System.** Appendix P provides two recognized methods for sizing the water service and water distribution piping for a building. The method under Section AP103 provides friction loss diagrams that require the user to “plot” points and read values from the diagrams in order to perform the required calculations and necessary checks. This method is the most accurate of the two presented in this appendix. The method under Section AP201 is known to be conservative; however, very few calculations are necessary in order to determine a pipe size that satisfies the flow requirements of any application.

**Appendix Q ICC *International Residential Code Electrical Provisions*/National Electrical Code Cross Reference.** This cross reference allows the code user to trace the code sections in Chapters 34 through 43 back to their source: the *National Electrical Code*. See the introduction to Chapter 34 for more information on the relationship between Part VIII of this code and the NEC, NFPA 70.



# ORDINANCE

The *International Codes* are designed and promulgated to be adopted by reference by ordinance. Jurisdictions wishing to adopt the 2009 *International Residential Code* as an enforceable regulation governing one- and two-family dwellings and townhouses should ensure that certain factual information is included in the adopting ordinance at the time adoption is being considered by the appropriate governmental body. The following sample adoption ordinance addresses several key elements of a code adoption ordinance, including the information required for insertion into the code text.

## SAMPLE ORDINANCE FOR ADOPTION OF THE INTERNATIONAL RESIDENTIAL CODE

### ORDINANCE NO. \_\_\_\_\_

An ordinance of the [JURISDICTION] adopting the 2009 edition of the *International Residential Code*, regulating and governing the construction, alteration, movement, enlargement, replacement, repair, equipment, location, removal and demolition of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with separate means of egress in the [JURISDICTION]; providing for the issuance of permits and collection of fees therefor; repealing Ordinance No. \_\_\_\_\_ of the [JURISDICTION] and all other ordinances and parts of the ordinances in conflict therewith.

The [GOVERNING BODY] of the [JURISDICTION] does ordain as follows:

**Section 1.** That a certain document, three (3) copies of which are on file in the office of the [TITLE OF JURISDICTION'S KEEPER OF RECORDS] of [NAME OF JURISDICTION], being marked and designated as the *International Residential Code*, 2009 edition, including Appendix Chapters [FILL IN THE APPENDIX CHAPTERS BEING ADOPTED] (see *International Residential Code* Section R102.5, 2009 edition), as published by the International Code Council, be and is hereby adopted as the Residential Code of the [JURISDICTION], in the State of [STATE NAME] for regulating and governing the construction, alteration, movement, enlargement, replacement, repair, equipment, location, removal and demolition of detached one- and two-family dwellings and multiple single-family dwellings (townhouses) not more than three stories in height with separate means of egress as herein provided; providing for the issuance of permits and collection of fees therefor; and each and all of the regulations, provisions, penalties, conditions and terms of said Residential Code on file in the office of the [JURISDICTION] are hereby referred to, adopted, and made a part hereof, as if fully set out in this ordinance, with the additions, insertions, deletions and changes, if any, prescribed in Section 2 of this ordinance.

**Section 2.** The following sections are hereby revised:

Section R101.1. Insert: [NAME OF JURISDICTION]

Table R301.2 (1) Insert: [APPROPRIATE DESIGN CRITERIA]

Section P2603.6.1 Insert: [NUMBER OF INCHES IN TWO LOCATIONS]

**Section 3.** That Ordinance No. \_\_\_\_\_ of [JURISDICTION] entitled [FILL IN HERE THE COMPLETE TITLE OF THE ORDINANCE OR ORDINANCES IN EFFECT AT THE PRESENT TIME SO THAT THEY WILL BE REPEALED BY DEFINITE MENTION] and all other ordinances or parts of ordinances in conflict herewith are hereby repealed.

**Section 4.** That if any section, subsection, sentence, clause or phrase of this ordinance is, for any reason, held to be unconstitutional, such decision shall not affect the validity of the remaining portions of this ordinance. The [GOVERNING BODY] hereby declares that it would have passed this ordinance, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases be declared unconstitutional.

**Section 5.** That nothing in this ordinance or in the Residential Code hereby adopted shall be construed to affect any suit or proceeding impending in any court, or any rights acquired, or liability incurred, or any cause or causes of action acquired or existing, under any act or ordinance hereby repealed as cited in Section 3 of this ordinance; nor shall any just or legal right or remedy of any character be lost, impaired or affected by this ordinance.

**Section 6.** That the [JURISDICTION'S KEEPER OF RECORDS] is hereby ordered and directed to cause this ordinance to be published. (An additional provision may be required to direct the number of times the ordinance is to be published and to specify that it is to be in a newspaper in general circulation. Posting may also be required.)

**Section 7.** That this ordinance and the rules, regulations, provisions, requirements, orders and matters established and adopted hereby shall take effect and be in full force and effect [TIME PERIOD] from and after the date of its final passage and adoption.



# TABLE OF CONTENTS

|                                                              |           |                                              |                                                                    |     |
|--------------------------------------------------------------|-----------|----------------------------------------------|--------------------------------------------------------------------|-----|
| <i>Part I—Administrative</i> . . . . .                       | <b>1</b>  | R310                                         | Emergency Escape and Rescue Openings . . . . .                     | 58  |
| <b>CHAPTER 1 SCOPE AND ADMINISTRATION</b> . . .              | <b>1</b>  | R311                                         | Means of Egress . . . . .                                          | 59  |
| <b>PART 1—SCOPE AND APPLICATION</b> . . . . .                | <b>1</b>  | R312                                         | Guards . . . . .                                                   | 62  |
| Section                                                      |           | R313                                         | Automatic Fire Sprinkler Systems . . . . .                         | 62  |
| R101 General . . . . .                                       | 1         | R314                                         | Smoke Alarms . . . . .                                             | 62  |
| R102 Applicability . . . . .                                 | 1         | R315                                         | Carbon Monoxide Alarms . . . . .                                   | 63  |
| <b>PART II—ADMINISTRATION AND ENFORCEMENT</b> . . . . .      | <b>1</b>  | R316                                         | Foam Plastic . . . . .                                             | 63  |
| R103 Department of Building Safety . . . . .                 | 1         | R317                                         | Protection of Wood and Wood Based Products Against Decay . . . . . | 65  |
| R104 Duties and Powers of the Building Official . . . . .    | 2         | R318                                         | Protection Against Subterranean Termites . . . . .                 | 66  |
| R105 Permits . . . . .                                       | 3         | R319                                         | Site Address . . . . .                                             | 67  |
| R106 Construction Documents . . . . .                        | 5         | R320                                         | Accessibility . . . . .                                            | 67  |
| R107 Temporary Structures and Uses . . . . .                 | 6         | R321                                         | Elevators and Platform Lifts . . . . .                             | 67  |
| R108 Fees . . . . .                                          | 6         | R322                                         | Flood-resistant Construction . . . . .                             | 67  |
| R109 Inspections . . . . .                                   | 6         | R323                                         | Storm Shelters . . . . .                                           | 70  |
| R110 Certificate of Occupancy . . . . .                      | 7         | <b>CHAPTER 4 FOUNDATIONS</b> . . . . .       | <b>71</b>                                                          |     |
| R111 Service Utilities . . . . .                             | 7         | Section                                      |                                                                    |     |
| R112 Board of Appeals . . . . .                              | 7         | R401                                         | General . . . . .                                                  | 71  |
| R113 Violations . . . . .                                    | 8         | R402                                         | Materials . . . . .                                                | 71  |
| R114 Stop Work Order . . . . .                               | 8         | R403                                         | Footings . . . . .                                                 | 72  |
| <i>Part II—Definitions</i> . . . . .                         | <b>9</b>  | R404                                         | Foundation and Retaining Walls . . . . .                           | 86  |
| <b>CHAPTER 2 DEFINITIONS</b> . . . . .                       | <b>9</b>  | R405                                         | Foundation Drainage . . . . .                                      | 105 |
| Section                                                      |           | R406                                         | Foundation Waterproofing and Dampproofing . . . . .                | 107 |
| R201 General . . . . .                                       | 9         | R407                                         | Columns . . . . .                                                  | 108 |
| R202 Definitions . . . . .                                   | 9         | R408                                         | Under-floor Space . . . . .                                        | 108 |
| <i>Part III—Building Planning and Construction</i> . . . . . | <b>23</b> | <b>CHAPTER 5 FLOORS</b> . . . . .            | <b>111</b>                                                         |     |
| <b>CHAPTER 3 BUILDING PLANNING</b> . . . . .                 | <b>23</b> | Section                                      |                                                                    |     |
| Section                                                      |           | R501                                         | General . . . . .                                                  | 111 |
| R301 Design Criteria . . . . .                               | 23        | R502                                         | Wood Floor Framing . . . . .                                       | 111 |
| R302 Fire-resistant Construction . . . . .                   | 49        | R503                                         | Floor Sheathing . . . . .                                          | 122 |
| R303 Light, Ventilation and Heating . . . . .                | 53        | R504                                         | Pressure Preservatively Treated-wood Floors (On Ground) . . . . .  | 124 |
| R304 Minimum Room Areas . . . . .                            | 54        | R505                                         | Steel Floor Framing . . . . .                                      | 124 |
| R305 Ceiling Height . . . . .                                | 54        | R506                                         | Concrete Floors (On Ground) . . . . .                              | 144 |
| R306 Sanitation . . . . .                                    | 55        | <b>CHAPTER 6 WALL CONSTRUCTION</b> . . . . . | <b>145</b>                                                         |     |
| R307 Toilet, Bath and Shower Spaces . . . . .                | 55        | Section                                      |                                                                    |     |
| R308 Glazing . . . . .                                       | 55        | R601                                         | General . . . . .                                                  | 145 |
| R309 Garages and Carports . . . . .                          | 58        | R602                                         | Wood Wall Framing . . . . .                                        | 146 |
|                                                              |           | R603                                         | Steel Wall Framing . . . . .                                       | 187 |

## TABLE OF CONTENTS

|      |                                                       |     |
|------|-------------------------------------------------------|-----|
| R604 | Wood Structural Panels .....                          | 261 |
| R605 | Particleboard .....                                   | 261 |
| R606 | General Masonry Construction .....                    | 261 |
| R607 | Unit Masonry .....                                    | 269 |
| R608 | Multiple Wythe Masonry .....                          | 270 |
| R609 | Grouted Masonry .....                                 | 271 |
| R610 | Glass Unit Masonry .....                              | 273 |
| R611 | Exterior Concrete Wall Construction .....             | 274 |
| R612 | Exterior Windows and Doors .....                      | 345 |
| R613 | Structural Insulated Panel Wall<br>Construction ..... | 348 |

### CHAPTER 7 WALL COVERING ..... 357

#### Section

|      |                         |     |
|------|-------------------------|-----|
| R701 | General .....           | 357 |
| R702 | Interior Covering ..... | 357 |
| R703 | Exterior Covering ..... | 360 |

### CHAPTER 8 ROOF-CEILING CONSTRUCTION ..... 373

#### Section

|      |                          |     |
|------|--------------------------|-----|
| R801 | General .....            | 373 |
| R802 | Wood Roof Framing .....  | 373 |
| R803 | Roof Sheathing .....     | 399 |
| R804 | Steel Roof Framing ..... | 399 |
| R805 | Ceiling Finishes .....   | 430 |
| R806 | Roof Ventilation .....   | 430 |
| R807 | Attic Access .....       | 431 |

### CHAPTER 9 ROOF ASSEMBLIES ..... 433

#### Section

|      |                                       |     |
|------|---------------------------------------|-----|
| R901 | General .....                         | 433 |
| R902 | Roof Classification .....             | 433 |
| R903 | Weather Protection .....              | 433 |
| R904 | Materials .....                       | 433 |
| R905 | Requirements for Roof Coverings ..... | 435 |
| R906 | Roof Insulation .....                 | 443 |
| R907 | Reroofing .....                       | 443 |

### CHAPTER 10 CHIMNEYS AND FIREPLACES... 445

#### Section

|       |                                |     |
|-------|--------------------------------|-----|
| R1001 | Masonry Fireplaces .....       | 445 |
| R1002 | Masonry Heaters .....          | 448 |
| R1003 | Masonry Chimneys .....         | 449 |
| R1004 | Factory-built Fireplaces ..... | 454 |

|       |                              |     |
|-------|------------------------------|-----|
| R1005 | Factory-built Chimneys ..... | 454 |
| R1006 | Exterior Air Supply .....    | 454 |

### Part IV—Energy Conservation ..... 455

### CHAPTER 11 ENERGY EFFICIENCY ..... 455

#### Section

|       |                                 |     |
|-------|---------------------------------|-----|
| N1101 | General .....                   | 455 |
| N1102 | Building Thermal Envelope ..... | 468 |
| N1103 | Systems .....                   | 471 |
| N1104 | Lighting Systems .....          | 473 |

### Part V—Mechanical ..... 475

### CHAPTER 12 MECHANICAL ADMINISTRATION ..... 475

#### Section

|       |                                   |     |
|-------|-----------------------------------|-----|
| M1201 | General .....                     | 475 |
| M1202 | Existing Mechanical Systems ..... | 475 |

### CHAPTER 13 GENERAL MECHANICAL SYSTEM REQUIREMENTS ..... 477

#### Section

|       |                                                |     |
|-------|------------------------------------------------|-----|
| M1301 | General .....                                  | 477 |
| M1302 | Approval .....                                 | 477 |
| M1303 | Labeling of Appliances .....                   | 477 |
| M1304 | Type of Fuel .....                             | 477 |
| M1305 | Appliance Access .....                         | 477 |
| M1306 | Clearances from Combustible Construction ..... | 478 |
| M1307 | Appliance Installation .....                   | 478 |
| M1308 | Mechanical Systems Installation .....          | 481 |

### CHAPTER 14 HEATING AND COOLING EQUIPMENT ..... 483

#### Section

|       |                                       |     |
|-------|---------------------------------------|-----|
| M1401 | General .....                         | 483 |
| M1402 | Central Furnaces .....                | 483 |
| M1403 | Heat Pump Equipment .....             | 483 |
| M1404 | Refrigeration Cooling Equipment ..... | 483 |
| M1405 | Baseboard Convectors .....            | 483 |
| M1406 | Radiant Heating Systems .....         | 483 |
| M1407 | Duct Heaters .....                    | 484 |
| M1408 | Vented Floor Furnaces .....           | 484 |
| M1409 | Vented Wall Furnaces .....            | 484 |
| M1410 | Vented Room Heaters .....             | 485 |

|                                                            |            |                                                               |            |
|------------------------------------------------------------|------------|---------------------------------------------------------------|------------|
| M1411 Heating and Cooling Equipment.....                   | 485        | M2003 Expansion Tanks .....                                   | 503        |
| M1412 Absorption Cooling Equipment .....                   | 486        | M2004 Water Heaters Used for Space Heating.....               | 503        |
| M1413 Evaporative Cooling Equipment.....                   | 486        | M2005 Water Heaters.....                                      | 503        |
| M1414 Fireplace Stoves .....                               | 486        | M2006 Pool Heaters.....                                       | 504        |
| M1415 Masonry Heaters .....                                | 486        |                                                               |            |
| <b>CHAPTER 15 EXHAUST SYSTEMS.....</b>                     | <b>487</b> | <b>CHAPTER 21 HYDRONIC PIPING.....</b>                        | <b>505</b> |
| Section                                                    |            | Section                                                       |            |
| M1501 General .....                                        | 487        | M2101 Hydronic Piping Systems Installation .....              | 505        |
| M1502 Clothes Dryer Exhaust.....                           | 487        | M2102 Baseboard Convectors.....                               | 505        |
| M1503 Range Hoods .....                                    | 488        | M2103 Floor Heating Systems.....                              | 505        |
| M1504 Installation of Microwave Ovens .....                | 488        | M2104 Low Temperature Piping.....                             | 507        |
| M1505 Overhead Exhaust Hoods .....                         | 488        | M2105 Ground Source Heat Pump System<br>Loop Piping .....     | 508        |
| M1506 Exhaust Ducts.....                                   | 488        |                                                               |            |
| M1507 Mechanical Ventilation .....                         | 488        | <b>CHAPTER 22 SPECIAL PIPING AND<br/>STORAGE SYSTEMS.....</b> | <b>509</b> |
|                                                            |            | Section                                                       |            |
| <b>CHAPTER 16 DUCT SYSTEMS.....</b>                        | <b>491</b> | M2201 Oil Tanks .....                                         | 509        |
| Section                                                    |            | M2202 Oil Piping, Fitting and Connections.....                | 509        |
| M1601 Duct Construction .....                              | 491        | M2203 Installation .....                                      | 509        |
| M1602 Return Air.....                                      | 493        | M2204 Oil Pumps and Valves .....                              | 510        |
|                                                            |            |                                                               |            |
| <b>CHAPTER 17 COMBUSTION AIR .....</b>                     | <b>495</b> | <b>CHAPTER 23 SOLAR SYSTEMS.....</b>                          | <b>511</b> |
| Section                                                    |            | Section                                                       |            |
| M1701 General .....                                        | 495        | M2301 Solar Energy Systems .....                              | 511        |
|                                                            |            |                                                               |            |
| <b>CHAPTER 18 CHIMNEYS AND VENTS .....</b>                 | <b>497</b> | <b>Part VI—Fuel Gas .....</b>                                 | <b>513</b> |
| Section                                                    |            |                                                               |            |
| M1801 General .....                                        | 497        | <b>CHAPTER 24 FUEL GAS.....</b>                               | <b>513</b> |
| M1802 Vent Components.....                                 | 497        | Section                                                       |            |
| M1803 Chimney and Vent Connectors .....                    | 498        | G2401 General .....                                           | 513        |
| M1804 Vents .....                                          | 499        | G2402 General .....                                           | 513        |
| M1805 Masonry and Factory-built Chimneys.....              | 499        | G2403 General Definitions .....                               | 513        |
|                                                            |            | G2404 General .....                                           | 519        |
| <b>CHAPTER 19 SPECIAL FUEL-BURNING<br/>EQUIPMENT .....</b> | <b>501</b> | G2405 Structural Safety.....                                  | 519        |
| Section                                                    |            | G2406 Appliance Location .....                                | 519        |
| M1901 Ranges and Ovens .....                               | 501        | G2407 Combustion, Ventilation and Dilution Air ....           | 520        |
| M1902 Sauna Heaters.....                                   | 501        | G2408 Installation .....                                      | 524        |
| M1903 Stationary Fuel Cell Power Plants .....              | 501        | G2409 Clearance Reduction .....                               | 524        |
| M1904 Gaseous Hydrogen Systems .....                       | 501        | G2410 Electrical.....                                         | 526        |
|                                                            |            | G2411 Electrical Bonding .....                                | 526        |
| <b>CHAPTER 20 BOILERS AND<br/>WATER HEATERS .....</b>      | <b>503</b> | G2412 General .....                                           | 528        |
| Section                                                    |            | G2413 Pipe Sizing .....                                       | 528        |
| M2001 Boilers.....                                         | 503        | G2414 Piping Materials.....                                   | 550        |
| M2002 Operating and Safety Controls .....                  | 503        | G2415 Piping System Installation.....                         | 552        |
|                                                            |            | G2416 Piping Bends and Changes in Direction.....              | 553        |

## TABLE OF CONTENTS

|       |                                                                                          |     |
|-------|------------------------------------------------------------------------------------------|-----|
| G2417 | Inspection, Testing and Purging .....                                                    | 554 |
| G2418 | Piping Support .....                                                                     | 555 |
| G2419 | Drips and Sloped Piping .....                                                            | 555 |
| G2420 | Gas Shutoff Valves.....                                                                  | 555 |
| G2421 | Flow Controls.....                                                                       | 556 |
| G2422 | Appliance Connections .....                                                              | 557 |
| G2423 | CNG Gas-dispensing Systems .....                                                         | 558 |
| G2424 | Piping Support Intervals .....                                                           | 558 |
| G2425 | General .....                                                                            | 558 |
| G2426 | Vents .....                                                                              | 559 |
| G2427 | Venting of Appliances .....                                                              | 560 |
| G2428 | Sizing of Category I Appliance<br>Venting Systems.....                                   | 569 |
| G2429 | Direct-vent, Integral Vent, Mechanical Vent<br>and Ventilation/Exhaust Hood Venting..... | 581 |
| G2430 | Factory-built Chimneys .....                                                             | 581 |
| G2431 | General .....                                                                            | 581 |
| G2432 | Decorative Appliances for Installation<br>in Fireplaces.....                             | 581 |
| G2433 | Log Lighters .....                                                                       | 581 |
| G2434 | Vented Gas Fireplaces<br>(Decorative Fireplaces) .....                                   | 581 |
| G2435 | Vented Gas Fireplace Heaters .....                                                       | 581 |
| G2436 | Vented Wall Furnaces .....                                                               | 581 |
| G2437 | Floor Furnaces .....                                                                     | 582 |
| G2438 | Clothes Dryers .....                                                                     | 582 |
| G2439 | Clothes Dryer Exhaust.....                                                               | 582 |
| G2440 | Sauna Heaters.....                                                                       | 583 |
| G2441 | Pool and Spa Heaters.....                                                                | 584 |
| G2442 | Forced-air Warm-air Furnaces.....                                                        | 584 |
| G2443 | Conversion Burners .....                                                                 | 585 |
| G2444 | Unit Heaters .....                                                                       | 585 |
| G2445 | Unvented Room Heaters .....                                                              | 585 |
| G2446 | Vented Room Heaters .....                                                                | 585 |
| G2447 | Cooking Appliances.....                                                                  | 586 |
| G2448 | Water Heaters.....                                                                       | 586 |
| G2449 | Air Conditioning Appliances .....                                                        | 586 |
| G2450 | Illuminating Appliances .....                                                            | 586 |
| G2451 | Infrared Radiant Heaters .....                                                           | 587 |
| G2452 | Boilers.....                                                                             | 587 |
| G2453 | Chimney Damper Opening Area.....                                                         | 587 |

## **Part VII—Plumbing..... 589**

### **CHAPTER 25 PLUMBING ADMINISTRATION ..... 589**

#### Section

|       |                                |     |
|-------|--------------------------------|-----|
| P2501 | General .....                  | 589 |
| P2502 | Existing Plumbing Systems..... | 589 |
| P2503 | Inspection and Tests.....      | 589 |

### **CHAPTER 26 GENERAL PLUMBING REQUIREMENTS ..... 591**

#### Section

|       |                                                      |     |
|-------|------------------------------------------------------|-----|
| P2601 | General .....                                        | 591 |
| P2602 | Individual Water Supply and<br>Sewage Disposal ..... | 591 |
| P2603 | Structural and Piping Protection.....                | 591 |
| P2604 | Trenching and Backfilling.....                       | 592 |
| P2605 | Support .....                                        | 592 |
| P2606 | Waterproofing of Openings.....                       | 592 |
| P2607 | Workmanship .....                                    | 592 |
| P2608 | Materials Evaluation and Listing .....               | 592 |

### **CHAPTER 27 PLUMBING FIXTURES..... 595**

#### Section

|       |                                              |     |
|-------|----------------------------------------------|-----|
| P2701 | Fixtures, Faucets and Fixture Fittings ..... | 595 |
| P2702 | Fixture Accessories .....                    | 595 |
| P2703 | Tail Pieces.....                             | 595 |
| P2704 | Access to Connections.....                   | 595 |
| P2705 | Installation .....                           | 595 |
| P2706 | Waste Receptors.....                         | 595 |
| P2707 | Directional Fittings .....                   | 597 |
| P2708 | Showers .....                                | 597 |
| P2709 | Shower Receptors .....                       | 597 |
| P2710 | Shower Walls .....                           | 598 |
| P2711 | Lavatories .....                             | 598 |
| P2712 | Water Closets .....                          | 598 |
| P2713 | Bathtubs .....                               | 599 |
| P2714 | Sinks.....                                   | 599 |
| P2715 | Laundry Tubs .....                           | 599 |
| P2716 | Food Waste Grinder.....                      | 599 |
| P2717 | Dishwashing Machines .....                   | 599 |
| P2718 | Clothes Washing Machine.....                 | 599 |
| P2719 | Floor Drains .....                           | 599 |
| P2720 | Whirlpool Bathtubs .....                     | 599 |
| P2721 | Bidet Installations .....                    | 600 |

|                                                                   |                                                                |     |                                                      |                                                                                    |     |
|-------------------------------------------------------------------|----------------------------------------------------------------|-----|------------------------------------------------------|------------------------------------------------------------------------------------|-----|
| P2722                                                             | Fixture Fitting . . . . .                                      | 600 | P3111                                                | Combination Waste and Vent System . . . . .                                        | 637 |
| P2723                                                             | Macerating Toilet Systems . . . . .                            | 600 | P3112                                                | Island Fixture Venting . . . . .                                                   | 638 |
| P2724                                                             | Speciality Temperature Control Devices<br>and Valves . . . . . | 600 | P3113                                                | Vent Pipe Sizing . . . . .                                                         | 638 |
| <b>CHAPTER 28 WATER HEATERS . . . . . 601</b>                     |                                                                |     | P3114                                                | Air Admittance Valves . . . . .                                                    | 638 |
| Section                                                           |                                                                |     | <b>CHAPTER 32 TRAPS . . . . . 641</b>                |                                                                                    |     |
| P2801                                                             | General . . . . .                                              | 601 | Section                                              |                                                                                    |     |
| P2802                                                             | Water Heaters Used for Space Heating . . . . .                 | 601 | P3201                                                | Fixture Traps . . . . .                                                            | 641 |
| P2803                                                             | Relief Valves . . . . .                                        | 601 | <b>CHAPTER 33 STORM DRAINAGE . . . . . 643</b>       |                                                                                    |     |
| <b>CHAPTER 29 WATER SUPPLY AND<br/>DISTRIBUTION . . . . . 603</b> |                                                                |     | Section                                              |                                                                                    |     |
| Section                                                           |                                                                |     | P3301                                                | General . . . . .                                                                  | 643 |
| P2901                                                             | General . . . . .                                              | 603 | P3302                                                | Subsoil Drains . . . . .                                                           | 643 |
| P2902                                                             | Protection of Potable Water Supply . . . . .                   | 603 | P3303                                                | Sumps and Pumping Systems . . . . .                                                | 643 |
| P2903                                                             | Water-supply System . . . . .                                  | 606 | <b>Part VIII—Electrical . . . . . 645</b>            |                                                                                    |     |
| P2904                                                             | Dwelling Unit Fire Sprinkler Systems . . . . .                 | 609 | <b>CHAPTER 34 GENERAL REQUIREMENTS . . . . 645</b>   |                                                                                    |     |
| P2905                                                             | Materials, Joints and Connections . . . . .                    | 621 | Section                                              |                                                                                    |     |
| P2906                                                             | Changes in Direction . . . . .                                 | 624 | E3401                                                | General . . . . .                                                                  | 645 |
| P2907                                                             | Support . . . . .                                              | 624 | E3402                                                | Building Structure Protection . . . . .                                            | 646 |
| P2908                                                             | Drinking Water Treatment Units . . . . .                       | 624 | E3403                                                | Inspection and Approval . . . . .                                                  | 646 |
| <b>CHAPTER 30 SANITARY DRAINAGE . . . . . 625</b>                 |                                                                |     | E3404                                                | General Equipment Requirements . . . . .                                           | 646 |
| Section                                                           |                                                                |     | E3405                                                | Equipment Location and Clearances . . . . .                                        | 648 |
| P3001                                                             | General . . . . .                                              | 625 | E3406                                                | Electrical Conductors and Connections . . . . .                                    | 648 |
| P3002                                                             | Materials . . . . .                                            | 625 | E3407                                                | Conductor and Terminal Identification . . . . .                                    | 650 |
| P3003                                                             | Joints and Connections . . . . .                               | 625 | <b>CHAPTER 35 ELECTRICAL DEFINITIONS . . . . 653</b> |                                                                                    |     |
| P3004                                                             | Determining Drainage Fixture Units . . . . .                   | 630 | Section                                              |                                                                                    |     |
| P3005                                                             | Drainage System . . . . .                                      | 630 | E3501                                                | General . . . . .                                                                  | 653 |
| P3006                                                             | Sizing of Drain Pipe Offsets . . . . .                         | 633 | <b>CHAPTER 36 SERVICES . . . . . 657</b>             |                                                                                    |     |
| P3007                                                             | Sumps and Ejectors . . . . .                                   | 633 | Section                                              |                                                                                    |     |
| P3008                                                             | Backwater Valves . . . . .                                     | 634 | E3601                                                | General Services . . . . .                                                         | 657 |
| <b>CHAPTER 31 VENTS . . . . . 635</b>                             |                                                                |     | E3602                                                | Service Size and Rating . . . . .                                                  | 657 |
| Section                                                           |                                                                |     | E3603                                                | Service, Feeder and Grounding<br>Electrode Conductor Sizing . . . . .              | 658 |
| P3101                                                             | Vent Systems . . . . .                                         | 635 | E3604                                                | Overhead Service-drop and Service<br>Conductor Installation . . . . .              | 659 |
| P3102                                                             | Vent Stacks and Stack Vents . . . . .                          | 635 | E3605                                                | Service-entrance Conductors . . . . .                                              | 661 |
| P3103                                                             | Vent Terminals . . . . .                                       | 635 | E3606                                                | Service Equipment—General . . . . .                                                | 661 |
| P3104                                                             | Vent Connections and Grades . . . . .                          | 635 | E3607                                                | System Grounding . . . . .                                                         | 662 |
| P3105                                                             | Fixture Vents . . . . .                                        | 636 | E3608                                                | Grounding Electrode System . . . . .                                               | 662 |
| P3106                                                             | Individual Vent . . . . .                                      | 636 | E3609                                                | Bonding . . . . .                                                                  | 664 |
| P3107                                                             | Common Vent . . . . .                                          | 636 | E3610                                                | Grounding Electrode Conductors . . . . .                                           | 664 |
| P3108                                                             | Wet Venting . . . . .                                          | 636 | E3611                                                | Grounding Electrode Conductors<br>Connection to the Grounding Electrodes . . . . . | 665 |
| P3109                                                             | Waste Stack Vent . . . . .                                     | 637 |                                                      |                                                                                    |     |
| P3110                                                             | Circuit Venting . . . . .                                      | 637 |                                                      |                                                                                    |     |

## TABLE OF CONTENTS

### CHAPTER 37 BRANCH CIRCUIT AND FEEDER REQUIREMENTS ..... 667

#### Section

|       |                                                   |     |
|-------|---------------------------------------------------|-----|
| E3701 | General .....                                     | 667 |
| E3702 | Branch Circuit Ratings .....                      | 667 |
| E3703 | Required Branch Circuits .....                    | 668 |
| E3704 | Feeder Requirements .....                         | 669 |
| E3705 | Conductor Sizing and Overcurrent Protection ..... | 670 |
| E3706 | Panelboards .....                                 | 673 |

### CHAPTER 38 WIRING METHODS..... 675

#### Section

|       |                                             |     |
|-------|---------------------------------------------|-----|
| E3801 | General Requirements .....                  | 675 |
| E3802 | Above-ground Installation Requirements..... | 675 |
| E3803 | Underground Installation Requirements.....  | 678 |

### CHAPTER 39 POWER AND LIGHTING DISTRIBUTION..... 681

#### Section

|       |                                                                 |     |
|-------|-----------------------------------------------------------------|-----|
| E3901 | Receptacle Outlets .....                                        | 681 |
| E3902 | Ground-fault and Arc-fault Circuit-interrupter Protection ..... | 683 |
| E3903 | Lighting Outlets .....                                          | 684 |
| E3904 | General Installation Requirements .....                         | 684 |
| E3905 | Boxes, Conduit Bodies and Fittings .....                        | 695 |
| E3906 | Installation of Boxes, Conduit Bodies and Fittings .....        | 698 |
| E3907 | Cabinets and Panelboards .....                                  | 699 |
| E3908 | Grounding.....                                                  | 700 |
| E3909 | Flexible Cords .....                                            | 703 |

### CHAPTER 40 DEVICES AND LUMINAIRES .... 705

#### Section

|       |                              |     |
|-------|------------------------------|-----|
| E4001 | Switches .....               | 705 |
| E4002 | Receptacles.....             | 706 |
| E4003 | Fixtures.....                | 707 |
| E4004 | Luminaire Installation ..... | 708 |
| E4005 | Track Lighting .....         | 708 |

### CHAPTER 41 APPLIANCE INSTALLATION .... 711

#### Section

|       |               |     |
|-------|---------------|-----|
| E4101 | General ..... | 711 |
|-------|---------------|-----|

### CHAPTER 42 SWIMMING POOLS..... 713

#### Section

|       |               |     |
|-------|---------------|-----|
| E4201 | General ..... | 713 |
|-------|---------------|-----|

|       |                                                                          |     |
|-------|--------------------------------------------------------------------------|-----|
| E4202 | Wiring Methods for Pools, Spas, Hot Tubs and Hydromassage Bathtubs ..... | 713 |
| E4203 | Equipment Location and Clearances .....                                  | 715 |
| E4204 | Bonding .....                                                            | 716 |
| E4205 | Grounding.....                                                           | 718 |
| E4206 | Equipment Installation.....                                              | 719 |
| E4207 | Storable Swimming Pools .....                                            | 721 |
| E4208 | Spas and Hot Tubs .....                                                  | 722 |
| E4209 | Hydromassage Bathtubs .....                                              | 722 |

### CHAPTER 43 CLASS 2 REMOTE-CONTROL, SIGNALING AND POWER-LIMITED CIRCUITS ..... 725

#### Section

|       |                                 |     |
|-------|---------------------------------|-----|
| E4301 | General .....                   | 725 |
| E4302 | Power Sources .....             | 725 |
| E4303 | Wiring Methods .....            | 725 |
| E4304 | Installation Requirements ..... | 725 |

### *Part IX—Referenced Standards* ..... 727

### CHAPTER 44 REFERENCED STANDARDS ..... 727

### APPENDIX A SIZING AND CAPACITIES OF GAS PIPING ..... 749

### APPENDIX B SIZING OF VENTING SYSTEMS SERVING APPLIANCES EQUIPPED WITH DRAFT HOODS, CATEGORY I APPLIANCES, AND APPLIANCES LISTED FOR USE WITH TYPE B VENTS ..... 761

### APPENDIX C EXIT TERMINALS OF MECHANICAL DRAFT AND DIRECT-VENT VENTING SYSTEMS ..... 771

### APPENDIX D RECOMMENDED PROCEDURE FOR SAFETY INSPECTION OF AN EXISTING APPLIANCE INSTALLATION ..... 773

### APPENDIX E MANUFACTURED HOUSING USED AS DWELLINGS ..... 775

#### Section

|       |                                                                                 |     |
|-------|---------------------------------------------------------------------------------|-----|
| AE101 | Scope .....                                                                     | 775 |
| AE102 | Application to Existing Manufactured Homes and Building Service Equipment ..... | 775 |
| AE201 | Definitions .....                                                               | 776 |
| AE301 | Permits .....                                                                   | 776 |

|                                                                                    |            |                                                                                                 |            |
|------------------------------------------------------------------------------------|------------|-------------------------------------------------------------------------------------------------|------------|
| AE302 Application for Permit . . . . .                                             | 776        | <b>APPENDIX H PATIO COVERS . . . . .</b>                                                        | <b>795</b> |
| AE303 Permits Issuance . . . . .                                                   | 777        | Section                                                                                         |            |
| AE304 Fees . . . . .                                                               | 777        | AH101 General . . . . .                                                                         | 795        |
| AE305 Inspections . . . . .                                                        | 778        | AH102 Definition . . . . .                                                                      | 795        |
| AE306 Special Inspections . . . . .                                                | 779        | AH103 Permitted Uses . . . . .                                                                  | 795        |
| AE307 Utility Service . . . . .                                                    | 779        | AH104 Design Loads . . . . .                                                                    | 795        |
| AE401 Occupancy Classification . . . . .                                           | 779        | AH105 Light and Ventilation/Emergency Egress . . . . .                                          | 795        |
| AE402 Location on Property . . . . .                                               | 779        | AH106 Footings . . . . .                                                                        | 795        |
| AE501 Design . . . . .                                                             | 779        | AH107 Special Provisions for Aluminum Screen<br>Enclosures in Hurricane-prone Regions . . . . . | 795        |
| AE502 Foundation Systems . . . . .                                                 | 780        | <b>APPENDIX I PRIVATE SEWAGE DISPOSAL . . . . .</b>                                             | <b>797</b> |
| AE503 Skirting and Perimeter Enclosures . . . . .                                  | 780        | Section                                                                                         |            |
| AE504 Structural Additions . . . . .                                               | 780        | AI101 General . . . . .                                                                         | 797        |
| AE505 Building Service Equipment . . . . .                                         | 780        | <b>APPENDIX J EXISTING BUILDINGS<br/>AND STRUCTURES . . . . .</b>                               | <b>799</b> |
| AE506 Exits . . . . .                                                              | 781        | Section                                                                                         |            |
| AE507 Occupancy, Fire Safety and Energy<br>Conservation Standards . . . . .        | 781        | AJ101 Purpose and Intent . . . . .                                                              | 799        |
| AE600 Special Requirements for<br>Foundation Systems . . . . .                     | 781        | AJ102 Compliance . . . . .                                                                      | 799        |
| AE601 Footings and Foundations . . . . .                                           | 781        | AJ103 Preliminary Meeting . . . . .                                                             | 799        |
| AE602 Pier Construction . . . . .                                                  | 781        | AJ104 Evaluation of an Existing Building . . . . .                                              | 799        |
| AE603 Height of Piers . . . . .                                                    | 781        | AJ105 Permit . . . . .                                                                          | 800        |
| AE604 Anchorage Installations . . . . .                                            | 781        | AJ201 Definitions . . . . .                                                                     | 800        |
| AE605 Ties, Materials and Installation . . . . .                                   | 782        | AJ301 Repairs . . . . .                                                                         | 800        |
| AE606 Referenced Standards . . . . .                                               | 782        | AJ401 Renovations . . . . .                                                                     | 801        |
| <b>APPENDIX F RADON CONTROL METHODS . . . . .</b>                                  | <b>783</b> | AJ501 Alterations . . . . .                                                                     | 801        |
| Section                                                                            |            | AJ601 Reconstruction . . . . .                                                                  | 802        |
| AF101 Scope . . . . .                                                              | 783        | <b>APPENDIX K SOUND TRANSMISSION . . . . .</b>                                                  | <b>803</b> |
| AF102 Definitions . . . . .                                                        | 783        | Section                                                                                         |            |
| AF103 Requirements . . . . .                                                       | 783        | AK101 General . . . . .                                                                         | 803        |
| <b>APPENDIX G SWIMMING POOLS,<br/>SPAS AND HOT TUBS . . . . .</b>                  | <b>791</b> | AK102 Air-borne Sound . . . . .                                                                 | 803        |
| Section                                                                            |            | AK103 Structural-borne Sound . . . . .                                                          | 803        |
| AG101 General . . . . .                                                            | 791        | AK104 Referenced Standards . . . . .                                                            | 803        |
| AG102 Definitions . . . . .                                                        | 791        | <b>APPENDIX L PERMIT FEES . . . . .</b>                                                         | <b>805</b> |
| AG103 Swimming Pools . . . . .                                                     | 791        | <b>APPENDIX M HOME DAY CARE—<br/>R-3 OCCUPANCY . . . . .</b>                                    | <b>807</b> |
| AG104 Spas and Hot Tubs . . . . .                                                  | 791        | AM101 General . . . . .                                                                         | 807        |
| AG105 Barrier Requirements . . . . .                                               | 791        | AM102 Definitions . . . . .                                                                     | 807        |
| AG106 Entrapment Protection for Swimming<br>Pool and Spa Suction Outlets . . . . . | 792        | AM103 Means of Egress . . . . .                                                                 | 807        |
| AG107 Abbreviations . . . . .                                                      | 793        | AM104 Smoke Detection . . . . .                                                                 | 808        |
| AG108 Standards . . . . .                                                          | 793        |                                                                                                 |            |

## TABLE OF CONTENTS

|                                                                                                                                            |            |
|--------------------------------------------------------------------------------------------------------------------------------------------|------------|
| <b>APPENDIX N VENTING METHODS .....</b>                                                                                                    | <b>809</b> |
| <b>APPENDIX O GRAY WATER<br/>RECYCLING SYSTEMS .....</b>                                                                                   | <b>817</b> |
| AO101 General .....                                                                                                                        | 817        |
| AO102 Systems for Flushing Water Closets<br>and Urinals .....                                                                              | 817        |
| AO103 Subsurface Landscape<br>Irrigation Systems .....                                                                                     | 819        |
| <b>APPENDIX P SIZING OF WATER<br/>PIPING SYSTEM.....</b>                                                                                   | <b>823</b> |
| AP101 General .....                                                                                                                        | 823        |
| AP102 Information Required.....                                                                                                            | 823        |
| AP103 Selection of Pipe Size .....                                                                                                         | 823        |
| AP201 Selection of Pipe Size .....                                                                                                         | 840        |
| <b>APPENDIX Q ICC INTERNATIONAL<br/>RESIDENTIAL CODE ELECTRICAL<br/>PROVISIONS/NATIONAL<br/>ELECTRICAL CODE CROSS-<br/>REFERENCE .....</b> | <b>843</b> |
| <b>INDEX.....</b>                                                                                                                          | <b>857</b> |

# Part I—Administrative

## CHAPTER 1

### SCOPE AND ADMINISTRATION

#### PART I—SCOPE AND APPLICATION

##### SECTION R101 GENERAL

**R101.1 Title.** These provisions shall be known as the *Residential Code for One- and Two-family Dwellings* of [NAME OF JURISDICTION], and shall be cited as such and will be referred to herein as “this code.”

**R101.2 Scope.** The provisions of the *International Residential Code for One- and Two-family Dwellings* shall apply to the construction, *alteration*, movement, enlargement, replacement, repair, equipment, use and occupancy, location, removal and demolition of detached one- and two-family dwellings and townhouses not more than three stories above *grade plane* in height with a separate means of egress and their *accessory structures*.

**Exception:** Live/work units complying with the requirements of Section 419 of the *International Building Code* shall be permitted to be built as one- and two-family *dwellings* or townhouses. Fire suppression required by Section 419.5 of the *International Building Code* when constructed under the *International Residential Code for One- and Two-family Dwellings* shall conform to Section 903.3.1.3 of the *International Building Code*.

**R101.3 Intent.** The purpose of this code is to establish minimum requirements to safeguard the public safety, health and general welfare through affordability, structural strength, means of egress facilities, stability, sanitation, light and ventilation, energy conservation and safety to life and property from fire and other hazards attributed to the built environment and to provide safety to fire fighters and emergency responders during emergency operations.

##### SECTION R102 APPLICABILITY

**R102.1 General.** Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable. Where, in any specific case, different sections of this code specify different materials, methods of construction or other requirements, the most restrictive shall govern.

**R102.2 Other laws.** The provisions of this code shall not be deemed to nullify any provisions of local, state or federal law.

**R102.3 Application of references.** References to chapter or section numbers, or to provisions not specifically identified by

number, shall be construed to refer to such chapter, section or provision of this code.

**R102.4 Referenced codes and standards.** The codes and standards referenced in this code shall be considered part of the requirements of this code to the prescribed extent of each such reference. Where differences occur between provisions of this code and referenced codes and standards, the provisions of this code shall apply.

**Exception:** Where enforcement of a code provision would violate the conditions of the *listing* of the *equipment* or *appliance*, the conditions of the *listing* and manufacturer's instructions shall apply.

**R102.5 Appendices.** Provisions in the appendices shall not apply unless specifically referenced in the adopting ordinance.

**R102.6 Partial invalidity.** In the event any part or provision of this code is held to be illegal or void, this shall not have the effect of making void or illegal any of the other parts or provisions.

**R102.7 Existing structures.** The legal occupancy of any structure existing on the date of adoption of this code shall be permitted to continue without change, except as is specifically covered in this code, the *International Property Maintenance Code* or the *International Fire Code*, or as is deemed necessary by the *building official* for the general safety and welfare of the occupants and the public.

**R102.7.1 Additions, alterations or repairs.** *Additions, alterations* or repairs to any structure shall conform to the requirements for a new structure without requiring the existing structure to comply with all of the requirements of this code, unless otherwise stated. *Additions, alterations* or repairs shall not cause an existing structure to become unsafe or adversely affect the performance of the building.

#### PART II—ADMINISTRATION AND ENFORCEMENT

##### SECTION R103 DEPARTMENT OF BUILDING SAFETY

**R103.1 Creation of enforcement agency.** The department of building safety is hereby created and the official in charge thereof shall be known as the *building official*.

**R103.2 Appointment.** The *building official* shall be appointed by the chief appointing authority of the *jurisdiction*.

**R103.3 Deputies.** In accordance with the prescribed procedures of this *jurisdiction* and with the concurrence of the appointing authority, the *building official* shall have the author-

ity to appoint a deputy *building official*, the related technical officers, inspectors, plan examiners and other employees. Such employees shall have powers as delegated by the *building official*.

## SECTION R104 DUTIES AND POWERS OF THE BUILDING OFFICIAL

**R104.1 General.** The *building official* is hereby authorized and directed to enforce the provisions of this code. The *building official* shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions. Such interpretations, policies and procedures shall be in conformance with the intent and purpose of this code. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code.

**R104.2 Applications and permits.** The *building official* shall receive applications, review *construction documents* and issue permits for the erection and alteration of buildings and structures, inspect the premises for which such permits have been issued and enforce compliance with the provisions of this code.

**R104.3 Notices and orders.** The *building official* shall issue all necessary notices or orders to ensure compliance with this code.

**R104.4 Inspections.** The *building official* is authorized to make all of the required inspections, or the *building official* shall have the authority to accept reports of inspection by *approved agencies* or individuals. Reports of such inspections shall be in writing and be certified by a responsible officer of such *approved agency* or by the responsible individual. The *building official* is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.

**R104.5 Identification.** The *building official* shall carry proper identification when inspecting structures or premises in the performance of duties under this code.

**R104.6 Right of entry.** Where it is necessary to make an inspection to enforce the provisions of this code, or where the *building official* has reasonable cause to believe that there exists in a structure or upon a premises a condition which is contrary to or in violation of this code which makes the structure or premises unsafe, dangerous or hazardous, the *building official* or designee is authorized to enter the structure or premises at reasonable times to inspect or to perform the duties imposed by this code, provided that if such structure or premises be occupied that credentials be presented to the occupant and entry requested. If such structure or premises be unoccupied, the *building official* shall first make a reasonable effort to locate the owner or other person having charge or control of the structure or premises and request entry. If entry is refused, the *building official* shall have recourse to the remedies provided by law to secure entry.

**R104.7 Department records.** The *building official* shall keep official records of applications received, permits and certificates issued, fees collected, reports of inspections, and notices and orders issued. Such records shall be retained in the official

records for the period required for the retention of public records.

**R104.8 Liability.** The *building official*, member of the board of appeals or employee charged with the enforcement of this code, while acting for the *jurisdiction* in good faith and without malice in the discharge of the duties required by this code or other pertinent law or ordinance, shall not thereby be rendered liable personally and is hereby relieved from personal liability for any damage accruing to persons or property as a result of any act or by reason of an act or omission in the discharge of official duties. Any suit instituted against an officer or employee because of an act performed by that officer or employee in the lawful discharge of duties and under the provisions of this code shall be defended by legal representative of the *jurisdiction* until the final termination of the proceedings. The *building official* or any subordinate shall not be liable for cost in any action, suit or proceeding that is instituted in pursuance of the provisions of this code.

**R104.9 Approved materials and equipment.** Materials, *equipment* and devices *approved* by the *building official* shall be constructed and installed in accordance with such approval.

**R104.9.1 Used materials and equipment.** Used materials, *equipment* and devices shall not be reused unless *approved* by the *building official*.

**R104.10 Modifications.** Wherever there are practical difficulties involved in carrying out the provisions of this code, the *building official* shall have the authority to grant modifications for individual cases, provided the *building official* shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements or structural. The details of action granting modifications shall be recorded and entered in the files of the department of building safety.

**R104.10.1 Areas prone to flooding.** The *building official* shall not grant modifications to any provision related to areas prone to flooding as established by Table R301.2(1) without the granting of a variance to such provisions by the board of appeals.

**R104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes in lieu of specific requirements of this code shall also be permitted as an alternate.

**R104.11.1 Tests.** Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for

alternative materials or methods, the *building official* shall have the authority to require tests as evidence of compliance to be made at no expense to the *jurisdiction*. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *building official* shall approve the testing procedures. Tests shall be performed by an *approved* agency. Reports of such tests shall be retained by the *building official* for the period required for retention of public records.

## SECTION R105 PERMITS

**R105.1 Required.** Any owner or authorized agent who intends to construct, enlarge, alter, repair, move, demolish or change the occupancy of a building or structure, or to erect, install, enlarge, alter, repair, remove, convert or replace any electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *building official* and obtain the required *permit*.

**R105.2 Work exempt from permit.** *Permits* shall not be required for the following. Exemption from *permit* requirements of this code shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other laws or ordinances of this *jurisdiction*.

### Building:

1. One-story detached *accessory structures* used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 200 square feet (18.58 m<sup>2</sup>).
2. Fences not over 6 feet (1829 mm) high.
3. Retaining walls that are not over 4 feet (1219 mm) in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge.
4. Water tanks supported directly upon *grade* if the capacity does not exceed 5,000 gallons (18 927 L) and the ratio of height to diameter or width does not exceed 2 to 1.
5. Sidewalks and driveways.
6. Painting, papering, tiling, carpeting, cabinets, counter tops and similar finish work.
7. Prefabricated swimming pools that are less than 24 inches (610 mm) deep.
8. Swings and other playground equipment.
9. Window awnings supported by an exterior wall which do not project more than 54 inches (1372 mm) from the exterior wall and do not require additional support.
10. Decks not exceeding 200 square feet (18.58 m<sup>2</sup>) in area, that are not more than 30 inches (762 mm) above *grade* at any point, are not attached to a *dwelling* and do not serve the exit door required by Section R311.4.

### Electrical:

1. *Listed* cord-and-plug connected temporary decorative lighting.
2. Reinstallation of attachment plug receptacles but not the outlets therefor.
3. Replacement of branch circuit overcurrent devices of the required capacity in the same location.
4. Electrical wiring, devices, *appliances*, apparatus or *equipment* operating at less than 25 volts and not capable of supplying more than 50 watts of energy.
5. Minor repair work, including the replacement of lamps or the connection of *approved* portable electrical *equipment* to *approved* permanently installed receptacles.

### Gas:

1. Portable heating, cooking or clothes drying *appliances*.
2. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
3. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

### Mechanical:

1. Portable heating *appliances*.
2. Portable ventilation *appliances*.
3. Portable cooling units.
4. Steam, hot- or chilled-water piping within any heating or cooling *equipment* regulated by this code.
5. Replacement of any minor part that does not alter approval of *equipment* or make such *equipment* unsafe.
6. Portable evaporative coolers.
7. Self-contained refrigeration systems containing 10 pounds (4.54 kg) or less of refrigerant or that are actuated by motors of 1 horsepower (746 W) or less.
8. Portable-fuel-cell *appliances* that are not connected to a fixed piping system and are not interconnected to a power grid.

The stopping of leaks in drains, water, soil, waste or vent pipe; provided, however, that if any concealed trap, drainpipe, water, soil, waste or vent pipe becomes defective and it becomes necessary to remove and replace the same with new material, such work shall be considered as new work and a *permit* shall be obtained and inspection made as provided in this code.

The clearing of stoppages or the repairing of leaks in pipes, valves or fixtures, and the removal and reinstallation of water closets, provided such repairs do not involve or require the replacement or rearrangement of valves, pipes or fixtures.

**R105.2.1 Emergency repairs.** Where *equipment* replacements and repairs must be performed in an emergency situation, the *permit* application shall be submitted within the next working business day to the *building official*.

**R105.2.2 Repairs.** Application or notice to the *building official* is not required for ordinary repairs to structures, replacement of lamps or the connection of *approved* portable electrical *equipment* to *approved* permanently installed receptacles. Such repairs shall not include the cutting away of any wall, partition or portion thereof, the removal or cutting of any structural beam or load-bearing support, or the removal or change of any required means of egress, or rearrangement of parts of a structure affecting the egress requirements; nor shall ordinary repairs include *addition*, *alteration* of, replacement or relocation of any water supply, sewer, drainage, drain leader, gas, soil, waste, vent or similar piping, electric wiring or mechanical or other work affecting public health or general safety.

**R105.2.3 Public service agencies.** A *permit* shall not be required for the installation, alteration or repair of generation, transmission, distribution, metering or other related *equipment* that is under the ownership and control of public service agencies by established right.

**R105.3 Application for permit.** To obtain a *permit*, the applicant shall first file an application therefor in writing on a form furnished by the department of building safety for that purpose. Such application shall:

1. Identify and describe the work to be covered by the *permit* for which application is made.
2. Describe the land on which the proposed work is to be done by legal description, street address or similar description that will readily identify and definitely locate the proposed building or work.
3. Indicate the use and occupancy for which the proposed work is intended.
4. Be accompanied by *construction documents* and other information as required in Section R106.1.
5. State the valuation of the proposed work.
6. Be signed by the applicant or the applicant's authorized agent.
7. Give such other data and information as required by the *building official*.

**R105.3.1 Action on application.** The *building official* shall examine or cause to be examined applications for permits and amendments thereto within a reasonable time after filing. If the application or the *construction documents* do not conform to the requirements of pertinent laws, the *building official* shall reject such application in writing stating the reasons therefor. If the *building official* is satisfied that the proposed work conforms to the requirements of this code and laws and ordinances applicable thereto, the *building official* shall issue a *permit* therefor as soon as practicable.

**R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas.** For applications for reconstruction, rehabilitation, *addition* or other improvement of existing buildings or structures located in an area prone to flooding as established by Table R301.2(1), the *building official* shall examine or cause to be examined the *construction documents* and shall prepare a finding with

regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamaged condition. If the *building official* finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the finding shall be provided to the board of appeals for a determination of substantial improvement or substantial damage. Applications determined by the board of appeals to constitute substantial improvement or substantial damage shall require all existing portions of the entire building or structure to meet the requirements of Section R322.

**R105.3.2 Time limitation of application.** An application for a *permit* for any proposed work shall be deemed to have been abandoned 180 days after the date of filing unless such application has been pursued in good faith or a *permit* has been issued; except that the *building official* is authorized to grant one or more extensions of time for additional periods not exceeding 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**R105.4 Validity of permit.** The issuance or granting of a *permit* shall not be construed to be a *permit* for, or an *approval* of, any violation of any of the provisions of this code or of any other ordinance of the *jurisdiction*. Permits presuming to give authority to violate or cancel the provisions of this code or other ordinances of the *jurisdiction* shall not be valid. The issuance of a *permit* based on *construction documents* and other data shall not prevent the *building official* from requiring the correction of errors in the *construction documents* and other data. The *building official* is also authorized to prevent occupancy or use of a structure where in violation of this code or of any other ordinances of this *jurisdiction*.

**R105.5 Expiration.** Every *permit* issued shall become invalid unless the work authorized by such *permit* is commenced within 180 days after its issuance, or if the work authorized by such *permit* is suspended or abandoned for a period of 180 days after the time the work is commenced. The *building official* is authorized to grant, in writing, one or more extensions of time, for periods not more than 180 days each. The extension shall be requested in writing and justifiable cause demonstrated.

**R105.6 Suspension or revocation.** The *building official* is authorized to suspend or revoke a *permit* issued under the provisions of this code wherever the *permit* is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

**R105.7 Placement of permit.** The building *permit* or copy thereof shall be kept on the site of the work until the completion of the project.

**R105.8 Responsibility.** It shall be the duty of every person who performs work for the installation or repair of building, structure, electrical, gas, mechanical or plumbing systems, for which this code is applicable, to comply with this code.

**R105.9 Preliminary inspection.** Before issuing a *permit*, the *building official* is authorized to examine or cause to be examined buildings, structures and sites for which an application has been filed.

## SECTION R106 CONSTRUCTION DOCUMENTS

**R106.1 Submittal documents.** Submittal documents consisting of *construction documents*, and other data shall be submitted in two or more sets with each application for a *permit*. The *construction documents* shall be prepared by a registered *design professional* where required by the statutes of the *jurisdiction* in which the project is to be constructed. Where special conditions exist, the *building official* is authorized to require additional *construction documents* to be prepared by a registered *design professional*.

**Exception:** The *building official* is authorized to waive the submission of *construction documents* and other data not required to be prepared by a registered *design professional* if it is found that the nature of the work applied for is such that reviewing of *construction documents* is not necessary to obtain compliance with this code.

**R106.1.1 Information on construction documents.** *Construction documents* shall be drawn upon suitable material. Electronic media documents are permitted to be submitted when *approved* by the *building official*. *Construction documents* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *building official*. Where required by the *building official*, all braced wall lines, shall be identified on the *construction documents* and all pertinent information including, but not limited to, bracing methods, location and length of braced wall panels, foundation requirements of braced wall panels at top and bottom shall be provided.

**R106.1.2 Manufacturer's installation instructions.** Manufacturer's installation instructions, as required by this code, shall be available on the job site at the time of inspection.

**R106.1.3 Information for construction in flood hazard areas.** For buildings and structures located in whole or in part in flood hazard areas as established by Table R301.2(1), *construction documents* shall include:

1. Delineation of flood hazard areas, floodway boundaries and flood zones and the design flood elevation, as appropriate;
2. The elevation of the proposed lowest floor, including *basement*; in areas of shallow flooding (AO Zones), the height of the proposed lowest floor, including *basement*, above the highest adjacent *grade*;
3. The elevation of the bottom of the lowest horizontal structural member in coastal high hazard areas (V Zone); and
4. If design flood elevations are not included on the community's Flood Insurance Rate Map (FIRM), the

*building official* and the applicant shall obtain and reasonably utilize any design flood elevation and floodway data available from other sources.

**R106.2 Site plan or plot plan.** The *construction documents* submitted with the application for *permit* shall be accompanied by a site plan showing the size and location of new construction and existing structures on the site and distances from *lot lines*. In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot. The *building official* is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.

**R106.3 Examination of documents.** The *building official* shall examine or cause to be examined *construction documents* for code compliance.

**R106.3.1 Approval of construction documents.** When the *building official* issues a *permit*, the *construction documents* shall be *approved* in writing or by a stamp which states "REVIEWED FOR CODE COMPLIANCE." One set of *construction documents* so reviewed shall be retained by the *building official*. The other set shall be returned to the applicant, shall be kept at the site of work and shall be open to inspection by the *building official* or his or her authorized representative.

**R106.3.2 Previous approvals.** This code shall not require changes in the *construction documents*, construction or designated occupancy of a structure for which a lawful *permit* has been heretofore issued or otherwise lawfully authorized, and the construction of which has been pursued in good faith within 180 days after the effective date of this code and has not been abandoned.

**R106.3.3 Phased approval.** The *building official* is authorized to issue a *permit* for the construction of foundations or any other part of a building or structure before the *construction documents* for the whole building or structure have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such *permit* for the foundation or other parts of a building or structure shall proceed at the holder's own risk with the building operation and without assurance that a *permit* for the entire structure will be granted.

**R106.4 Amended construction documents.** Work shall be installed in accordance with the *approved construction documents*, and any changes made during construction that are not in compliance with the *approved construction documents* shall be resubmitted for approval as an amended set of *construction documents*.

**R106.5 Retention of construction documents.** One set of *approved construction documents* shall be retained by the *building official* for a period of not less than 180 days from date of completion of the permitted work, or as required by state or local laws.

## SECTION R107 TEMPORARY STRUCTURES AND USES

**R107.1 General.** The *building official* is authorized to issue a *permit* for temporary structures and temporary uses. Such permits shall be limited as to time of service, but shall not be permitted for more than 180 days. The *building official* is authorized to grant extensions for demonstrated cause.

**R107.2 Conformance.** Temporary structures and uses shall conform to the structural strength, fire safety, means of egress, light, ventilation and sanitary requirements of this code as necessary to ensure the public health, safety and general welfare.

**R107.3 Temporary power.** The *building official* is authorized to give permission to temporarily supply and use power in part of an electric installation before such installation has been fully completed and the final certificate of completion has been issued. The part covered by the temporary certificate shall comply with the requirements specified for temporary lighting, heat or power in NFPA 70.

**R107.4 Termination of approval.** The *building official* is authorized to terminate such *permit* for a temporary structure or use and to order the temporary structure or use to be discontinued.

## SECTION R108 FEES

**R108.1 Payment of fees.** A *permit* shall not be valid until the fees prescribed by law have been paid. Nor shall an amendment to a *permit* be released until the additional fee, if any, has been paid.

**R108.2 Schedule of permit fees.** On buildings, structures, electrical, gas, mechanical and plumbing systems or *alterations* requiring a *permit*, a fee for each *permit* shall be paid as required, in accordance with the schedule as established by the applicable governing authority.

**R108.3 Building permit valuations.** Building *permit* valuation shall include total value of the work for which a *permit* is being issued, such as electrical, gas, mechanical, plumbing equipment and other permanent systems, including materials and labor.

**R108.4 Related fees.** The payment of the fee for the construction, alteration, removal or demolition for work done in connection with or concurrently with the work authorized by a building *permit* shall not relieve the applicant or holder of the *permit* from the payment of other fees that are prescribed by law.

**R108.5 Refunds.** The *building official* is authorized to establish a refund policy.

**R108.6 Work commencing before permit issuance.** Any person who commences work requiring a *permit* on a building, structure, electrical, gas, mechanical or plumbing system before obtaining the necessary permits shall be subject to a fee established by the applicable governing authority that shall be in addition to the required *permit* fees.

## SECTION R109 INSPECTIONS

**R109.1 Types of inspections.** For onsite construction, from time to time the *building official*, upon notification from the *permit* holder or his agent, shall make or cause to be made any necessary inspections and shall either approve that portion of the construction as completed or shall notify the *permit* holder or his or her agent wherein the same fails to comply with this code.

**R109.1.1 Foundation inspection.** Inspection of the foundation shall be made after poles or piers are set or trenches or *basement* areas are excavated and any required forms erected and any required reinforcing steel is in place and supported prior to the placing of concrete. The foundation inspection shall include excavations for thickened slabs intended for the support of bearing walls, partitions, structural supports, or *equipment* and special requirements for wood foundations.

**R109.1.2 Plumbing, mechanical, gas and electrical systems inspection.** Rough inspection of plumbing, mechanical, gas and electrical systems shall be made prior to covering or concealment, before fixtures or *appliances* are set or installed, and prior to framing inspection.

**Exception:** Back-filling of ground-source heat pump loop systems tested in accordance with Section M2105.1 prior to inspection shall be permitted.

**R109.1.3 Floodplain inspections.** For construction in areas prone to flooding as established by Table R301.2(1), upon placement of the lowest floor, including *basement*, and prior to further vertical construction, the *building official* shall require submission of documentation, prepared and sealed by a registered *design professional*, of the elevation of the lowest floor, including *basement*, required in Section R322.

**R109.1.4 Frame and masonry inspection.** Inspection of framing and masonry construction shall be made after the roof, masonry, all framing, firestopping, draftstopping and bracing are in place and after the plumbing, mechanical and electrical rough inspections are *approved*.

**R109.1.5 Other inspections.** In addition to the called inspections above, the *building official* may make or require any other inspections to ascertain compliance with this code and other laws enforced by the *building official*.

**R109.1.5.1 Fire-resistance-rated construction inspection.** Where fire-resistance-rated construction is required between *dwelling units* or due to location on property, the *building official* shall require an inspection of such construction after all lathing and/or wallboard is in place, but before any plaster is applied, or before wallboard joints and fasteners are taped and finished.

**R109.1.6 Final inspection.** Final inspection shall be made after the permitted work is complete and prior to occupancy.

**R109.2 Inspection agencies.** The *building official* is authorized to accept reports of *approved* agencies, provided such agencies satisfy the requirements as to qualifications and reliability.

**R109.3 Inspection requests.** It shall be the duty of the *permit* holder or their agent to notify the *building official* that such

work is ready for inspection. It shall be the duty of the person requesting any inspections required by this code to provide access to and means for inspection of such work.

**R109.4 Approval required.** Work shall not be done beyond the point indicated in each successive inspection without first obtaining the approval of the *building official*. The *building official* upon notification, shall make the requested inspections and shall either indicate the portion of the construction that is satisfactory as completed, or shall notify the *permit* holder or an agent of the *permit* holder wherein the same fails to comply with this code. Any portions that do not comply shall be corrected and such portion shall not be covered or concealed until authorized by the *building official*.

## SECTION R110 CERTIFICATE OF OCCUPANCY

**R110.1 Use and occupancy.** No building or structure shall be used or occupied, and no change in the existing occupancy classification of a building or structure or portion thereof shall be made until the *building official* has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the *jurisdiction*. Certificates presuming to give authority to violate or cancel the provisions of this code or other ordinances of the *jurisdiction* shall not be valid.

### Exceptions:

1. Certificates of occupancy are not required for work exempt from permits under Section R105.2.
2. Accessory buildings or structures.

**R110.2 Change in use.** Changes in the character or use of an existing structure shall not be made except as specified in Sections 3406 and 3407 of the *International Building Code*.

**R110.3 Certificate issued.** After the *building official* inspects the building or structure and finds no violations of the provisions of this code or other laws that are enforced by the department of building safety, the *building official* shall issue a certificate of occupancy which shall contain the following:

1. The building *permit* number.
2. The address of the structure.
3. The name and address of the owner.
4. A description of that portion of the structure for which the certificate is issued.
5. A statement that the described portion of the structure has been inspected for compliance with the requirements of this code.
6. The name of the *building official*.
7. The edition of the code under which the *permit* was issued.
8. If an automatic sprinkler system is provided and whether the sprinkler system is required.
9. Any special stipulations and conditions of the building *permit*.

**R110.4 Temporary occupancy.** The *building official* is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the *permit*, provided that such portion or portions shall be occupied safely. The *building official* shall set a time period during which the temporary certificate of occupancy is valid.

**R110.5 Revocation.** The *building official* shall, in writing, suspend or revoke a certificate of occupancy issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

## SECTION R111 SERVICE UTILITIES

**R111.1 Connection of service utilities.** No person shall make connections from a utility, source of energy, fuel or power to any building or system that is regulated by this code for which a *permit* is required, until *approved* by the *building official*.

**R111.2 Temporary connection.** The *building official* shall have the authority to authorize and approve the temporary connection of the building or system to the utility, source of energy, fuel or power.

**R111.3 Authority to disconnect service utilities.** The *building official* shall have the authority to authorize disconnection of utility service to the building, structure or system regulated by this code and the referenced codes and standards set forth in Section R102.4 in case of emergency where necessary to eliminate an immediate hazard to life or property or when such utility connection has been made without the approval required by Section R111.1 or R111.2. The *building official* shall notify the serving utility and whenever possible the owner and occupant of the building, structure or service system of the decision to disconnect prior to taking such action if not notified prior to disconnection. The owner or occupant of the building, structure or service system shall be notified in writing as soon as practical thereafter.

## SECTION R112 BOARD OF APPEALS

**R112.1 General.** In order to hear and decide appeals of orders, decisions or determinations made by the *building official* relative to the application and interpretation of this code, there shall be and is hereby created a board of appeals. The *building official* shall be an ex officio member of said board but shall have no vote on any matter before the board. The board of appeals shall be appointed by the governing body and shall hold office at its pleasure. The board shall adopt rules of procedure for conducting its business, and shall render all decisions and findings in writing to the appellant with a duplicate copy to the *building official*.

**R112.2 Limitations on authority.** An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply, or an equally good or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

**R112.2.1 Determination of substantial improvement in areas prone to flooding.** When the *building official* provides a finding required in Section R105.3.1.1, the board of appeals shall determine whether the value of the proposed work constitutes a substantial improvement. A substantial improvement means any repair, reconstruction, rehabilitation, *addition* or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. If the building or structure has sustained substantial damage, all repairs are considered substantial improvement regardless of the actual repair work performed. The term does not include:

1. Improvements of a building or structure required to correct existing health, sanitary or safety code violations identified by the *building official* and which are the minimum necessary to assure safe living conditions; or
2. Any alteration of an historic building or structure, provided that the alteration will not preclude the continued designation as an historic building or structure. For the purpose of this exclusion, an historic building is:
  - 2.1. *Listed* or preliminarily determined to be eligible for *listing* in the National Register of Historic Places; or
  - 2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district; or
  - 2.3. Designated as historic under a state or local historic preservation program that is *approved* by the Department of Interior.

**R112.2.2 Criteria for issuance of a variance for areas prone to flooding.** A variance shall be issued only upon:

1. A showing of good and sufficient cause that the unique characteristics of the size, configuration or topography of the site render the elevation standards in Section R322 inappropriate.
2. A determination that failure to grant the variance would result in exceptional hardship by rendering the *lot* undevelopable.
3. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, cause fraud on or victimization of the public, or conflict with existing local laws or ordinances.
4. A determination that the variance is the minimum necessary to afford relief, considering the flood hazard.
5. Submission to the applicant of written notice specifying the difference between the design flood elevation and the elevation to which the building is to be built, stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced floor elevation, and stating that construction below the design flood elevation increases risks to life and property.

**R112.3 Qualifications.** The board of appeals shall consist of members who are qualified by experience and training to pass on matters pertaining to building construction and are not employees of the *jurisdiction*.

**R112.4 Administration.** The *building official* shall take immediate action in accordance with the decision of the board.

## SECTION R113 VIOLATIONS

**R113.1 Unlawful acts.** It shall be unlawful for any person, firm or corporation to erect, construct, alter, extend, repair, move, remove, demolish or occupy any building, structure or *equipment* regulated by this code, or cause same to be done, in conflict with or in violation of any of the provisions of this code.

**R113.2 Notice of violation.** The *building official* is authorized to serve a notice of violation or order on the person responsible for the erection, construction, alteration, extension, repair, moving, removal, demolition or occupancy of a building or structure in violation of the provisions of this code, or in violation of a detail statement or a plan *approved* thereunder, or in violation of a *permit* or certificate issued under the provisions of this code. Such order shall direct the discontinuance of the illegal action or condition and the abatement of the violation.

**R113.3 Prosecution of violation.** If the notice of violation is not complied with in the time prescribed by such notice, the *building official* is authorized to request the legal counsel of the *jurisdiction* to institute the appropriate proceeding at law or in equity to restrain, correct or abate such violation, or to require the removal or termination of the unlawful occupancy of the building or structure in violation of the provisions of this code or of the order or direction made pursuant thereto.

**R113.4 Violation penalties.** Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the *approved construction documents* or directive of the *building official*, or of a *permit* or certificate issued under the provisions of this code, shall be subject to penalties as prescribed by law.

## SECTION R114 STOP WORK ORDER

**R114.1 Notice to owner.** Upon notice from the *building official* that work on any building or structure is being prosecuted contrary to the provisions of this code or in an unsafe and dangerous manner, such work shall be immediately stopped. The stop work order shall be in writing and shall be given to the owner of the property involved, or to the owner's agent or to the person doing the work and shall state the conditions under which work will be permitted to resume.

**R114.2 Unlawful continuance.** Any person who shall continue any work in or about the structure after having been served with a stop work order, except such work as that person is directed to perform to remove a violation or unsafe condition, shall be subject to penalties as prescribed by law.

## Part II—Definitions

### CHAPTER 2 DEFINITIONS

#### SECTION R201 GENERAL

**R201.1 Scope.** Unless otherwise expressly stated, the following words and terms shall, for the purposes of this code, have the meanings indicated in this chapter.

**R201.2 Interchangeability.** Words used in the present tense include the future; words in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

**R201.3 Terms defined in other codes.** Where terms are not defined in this code such terms shall have meanings ascribed to them as in other code publications of the International Code Council.

**R201.4 Terms not defined.** Where terms are not defined through the methods authorized by this section, such terms shall have ordinarily accepted meanings such as the context implies.

#### SECTION R202 DEFINITIONS

**ACCESSIBLE.** Signifies access that requires the removal of an access panel or similar removable obstruction.

**ACCESSIBLE, READILY.** Signifies access without the necessity for removing a panel or similar obstruction.

**ACCESSORY STRUCTURE.** A structure not greater than 3,000 square feet (279 m<sup>2</sup>) in floor area, and not over two stories in height, the use of which is customarily accessory to and incidental to that of the dwelling(s) and which is located on the same lot.

**ADDITION.** An extension or increase in floor area or height of a building or structure.

**ADHERED STONE OR MASONRY VENEER.** Stone or masonry veneer secured and supported through the adhesion of an *approved* bonding material applied to an *approved* backing.

**AIR ADMITTANCE VALVE.** A one-way valve designed to allow air into the plumbing drainage system when a negative pressure develops in the piping. This device shall close by gravity and seal the terminal under conditions of zero differential pressure (no flow conditions) and under positive internal pressure.

**AIR BARRIER.** Material(s) assembled and joined together to provide a barrier to air leakage through the building envelope. An air barrier may be a single material, or a combination of materials.

**AIR BREAK (DRAINAGE SYSTEM).** An arrangement in which a discharge pipe from a fixture, *appliance* or device drains indirectly into a receptor below the flood-level rim of the receptor, and above the trap seal.

**AIR CIRCULATION, FORCED.** A means of providing space conditioning utilizing movement of air through ducts or plenums by mechanical means.

**AIR-CONDITIONING SYSTEM.** A system that consists of heat exchangers, blowers, filters, supply, exhaust and return-air systems, and shall include any apparatus installed in connection therewith.

**AIR GAP, DRAINAGE SYSTEM.** The unobstructed vertical distance through free atmosphere between the outlet of a waste pipe and the flood-level rim of the fixture or receptor into which it is discharging.

**AIR GAP, WATER-DISTRIBUTION SYSTEM.** The unobstructed vertical distance through free atmosphere between the lowest opening from a water supply discharge to the flood-level rim of a plumbing fixture.

**AIR-IMPERMEABLE INSULATION.** An insulation having an air permanence equal to or less than 0.02 L/s-m<sup>2</sup> at 75 Pa pressure differential tested according to ASTM E 2178 or E 283.

**ALTERATION.** Any construction or renovation to an existing structure other than repair or addition that requires a *permit*. Also, a change in a mechanical system that involves an extension, addition or change to the arrangement, type or purpose of the original installation that requires a *permit*.

**ANCHORED STONE OR MASONRY VENEER.** Stone or masonry veneer secured with *approved* mechanical fasteners to an approved backing.

**ANCHORS.** See “Supports.”

**ANTISIPHON.** A term applied to valves or mechanical devices that eliminate siphonage.

**APPLIANCE.** A device or apparatus that is manufactured and designed to utilize energy and for which this code provides specific requirements.

**APPROVED.** Acceptable to the *building official*.

**APPROVED AGENCY.** An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been *approved* by the *building official*.

**ASPECT RATIO.** The ratio of longest to shortest perpendicular dimensions, or for wall sections, the ratio of height to length.

**ATTIC.** The unfinished space between the ceiling assembly of the top *story* and the roof assembly.

**ATTIC, HABITABLE.** A finished or unfinished area, not considered a *story*, complying with all of the following requirements:

1. The occupiable floor area is at least 70 square feet (17 m<sup>2</sup>), in accordance with Section R304,
2. The occupiable floor area has a ceiling height in accordance with Section R305, and
3. The occupiable space is enclosed by the roof assembly above, knee walls (if applicable) on the sides and the floor-ceiling assembly below.

**BACKFLOW, DRAINAGE.** A reversal of flow in the drainage system.

**BACKFLOW PREVENTER.** A device or means to prevent backflow.

**BACKFLOW PREVENTER, REDUCED-PRESSURE-ZONE TYPE.** A backflow-prevention device consisting of two independently acting check valves, internally force loaded to a normally closed position and separated by an intermediate chamber (or zone) in which there is an automatic relief means of venting to atmosphere internally loaded to a normally open position between two tightly closing shutoff valves and with means for testing for tightness of the checks and opening of relief means.

**BACKFLOW, WATER DISTRIBUTION.** The flow of water or other liquids into the potable water-supply piping from any sources other than its intended source. Backsiphonage is one type of backflow.

**BACKPRESSURE.** Pressure created by any means in the water distribution system, which by being in excess of the pressure in the water supply mains causes a potential backflow condition.

**BACKPRESSURE, LOW HEAD.** A pressure less than or equal to 4.33 psi (29.88 kPa) or the pressure exerted by a 10-foot (3048 mm) column of water.

**BACKSIPHONAGE.** The flowing back of used or contaminated water from piping into a potable water-supply pipe due to a negative pressure in such pipe.

**BACKWATER VALVE.** A device installed in a drain or pipe to prevent backflow of sewage.

**BASEMENT.** That portion of a building that is partly or completely below *grade* (see “*Story above grade*”).

**BASEMENT WALL.** The opaque portion of a wall that encloses one side of a *basement* and has an average below *grade* wall area that is 50 percent or more of the total opaque and non-opaque area of that enclosing side.

**BASIC WIND SPEED.** Three-second gust speed at 33 feet (10 058 mm) above the ground in Exposure C (see Section R301.2.1) as given in Figure R301.2(4).

**BATHROOM GROUP.** A group of fixtures, including or excluding a bidet, consisting of a water closet, lavatory, and bathtub or shower. Such fixtures are located together on the same floor level.

**BEND.** A drainage fitting, designed to provide a change in direction of a drain pipe of less than the angle specified by the

amount necessary to establish the desired slope of the line (see “*Elbow*” and “*Sweep*”).

**BOILER.** A self-contained *appliance* from which hot water is circulated for heating purposes and then returned to the boiler, and which operates at water pressures not exceeding 160 pounds per square inch gage (psig) (1102 kPa gauge) and at water temperatures not exceeding 250°F (121°C).

**BOND BEAM.** A horizontal grouted element within masonry in which reinforcement is embedded.

**BRACED WALL LINE.** A straight line through the building plan that represents the location of the lateral resistance provided by the wall bracing.

**BRACED WALL LINE, CONTINUOUSLY SHEATHED.** A *braced wall line* with structural sheathing applied to all sheathable surfaces including the areas above and below openings.

**BRACED WALL PANEL.** A full-height section of wall constructed to resist in-plane shear loads through interaction of framing members, sheathing material and anchors. The panel’s length meets the requirements of its particular bracing method, and contributes toward the total amount of bracing required along its *braced wall line* in accordance with Section R602.10.1.

**BRANCH.** Any part of the piping system other than a riser, main or stack.

**BRANCH, FIXTURE.** See “*Fixture branch, drainage*.”

**BRANCH, HORIZONTAL.** See “*Horizontal branch, drainage*.”

**BRANCH INTERVAL.** A vertical measurement of distance, 8 feet (2438 mm) or more in *developed length*, between the connections of horizontal branches to a drainage stack. Measurements are taken down the stack from the highest horizontal branch connection.

**BRANCH, MAIN.** A water-distribution pipe that extends horizontally off a main or riser to convey water to branches or fixture groups.

**BRANCH, VENT.** A vent connecting two or more individual vents with a vent stack or stack vent.

**BTU/H.** The *listed* maximum capacity of an *appliance*, absorption unit or burner expressed in British thermal units input per hour.

**BUILDING.** Building shall mean any one- and two-family dwelling or portion thereof, including *townhouses*, that is used, or designed or intended to be used for human habitation, for living, sleeping, cooking or eating purposes, or any combination thereof, and shall include accessory structures thereto.

**BUILDING DRAIN.** The lowest piping that collects the discharge from all other drainage piping inside the house and extends 30 inches (762 mm) in *developed length* of pipe, beyond the *exterior walls* and conveys the drainage to the *building sewer*.

**BUILDING, EXISTING.** Existing building is a building erected prior to the adoption of this code, or one for which a legal building *permit* has been issued.

**BUILDING LINE.** The line established by law, beyond which a building shall not extend, except as specifically provided by law.

**BUILDING OFFICIAL.** The officer or other designated authority charged with the administration and enforcement of this code.

**BUILDING SEWER.** That part of the drainage system that extends from the end of the *building drain* and conveys its discharge to a public sewer, private sewer, individual sewage-disposal system or other point of disposal.

**BUILDING THERMAL ENVELOPE.** The *basement walls*, *exterior walls*, floor, roof and any other building element that enclose *conditioned spaces*.

**BUILT-UP ROOF COVERING.** Two or more layers of felt cemented together and surfaced with a cap sheet, mineral aggregate, smooth coating or similar surfacing material.

**CAP PLATE.** The top plate of the double top plates used in structural insulated panel (SIP) construction. The cap plate is cut to match the panel thickness such that it overlaps the wood structural panel facing on both sides.

**CEILING HEIGHT.** The clear vertical distance from the finished floor to the finished ceiling.

**CEMENT PLASTER.** A mixture of portland or blended cement, portland cement or blended cement and hydrated lime, masonry cement or plastic cement and aggregate and other *approved* materials as specified in this code.

**CHIMNEY.** A primary vertical structure containing one or more flues, for the purpose of carrying gaseous products of combustion and air from a fuel-burning *appliance* to the outside atmosphere.

**CHIMNEY CONNECTOR.** A pipe that connects a fuel-burning *appliance* to a chimney.

#### CHIMNEY TYPES.

**Residential-type appliance.** An *approved* chimney for removing the products of combustion from fuel-burning, residential-type *appliances* producing combustion gases not in excess of 1,000°F (538°C) under normal operating conditions, but capable of producing combustion gases of 1,400°F (760°C) during intermittent forces firing for periods up to 1 hour. All temperatures shall be measured at the *appliance* flue outlet. Residential-type *appliance* chimneys include masonry and factory-built types.

**CIRCUIT VENT.** A vent that connects to a horizontal drainage branch and vents two traps to a maximum of eight traps or trapped fixtures connected into a battery.

**CLADDING.** The exterior materials that cover the surface of the building envelope that is directly loaded by the wind.

**CLEANOUT.** An accessible opening in the drainage system used for the removal of possible obstruction.

**CLOSET.** A small room or chamber used for storage.

**COMBINATION WASTE AND VENT SYSTEM.** A specially designed system of waste piping embodying the horizontal wet venting of one or more sinks or floor drains by means of

a common waste and vent pipe adequately sized to provide free movement of air above the flow line of the drain.

**COMBUSTIBLE MATERIAL.** Any material not defined as noncombustible.

**COMBUSTION AIR.** The air provided to fuel-burning *equipment* including air for fuel combustion, draft hood dilution and ventilation of the *equipment* enclosure.

**COMMON VENT.** A single pipe venting two trap arms within the same *branch interval*, either back-to-back or one above the other.

**CONDENSATE.** The liquid that separates from a gas due to a reduction in temperature, e.g., water that condenses from flue gases and water that condenses from air circulating through the cooling coil in air conditioning *equipment*.

**CONDENSING APPLIANCE.** An *appliance* that condenses water generated by the burning of fuels.

**CONDITIONED AIR.** Air treated to control its temperature, relative humidity or quality.

**CONDITIONED AREA.** That area within a building provided with heating and/or cooling systems or *appliances* capable of maintaining, through design or heat loss/gain, 68°F (20°C) during the heating season and/or 80°F (27°C) during the cooling season, or has a fixed opening directly adjacent to a conditioned area.

**CONDITIONED FLOOR AREA.** The horizontal projection of the floors associated with the *conditioned space*.

**CONDITIONED SPACE.** For energy purposes, space within a building that is provided with heating and/or cooling *equipment* or systems capable of maintaining, through design or heat loss/gain, 50°F (10°C) during the heating season and 85°F (29°C) during the cooling season, or communicates directly with a *conditioned space*. For mechanical purposes, an area, room or space being heated or cooled by any *equipment* or *appliance*.

**CONSTRUCTION DOCUMENTS.** Written, graphic and pictorial documents prepared or assembled for describing the design, location and physical characteristics of the elements of a project necessary for obtaining a building *permit*. Construction drawings shall be drawn to an appropriate scale.

**CONTAMINATION.** An impairment of the quality of the potable water that creates an actual hazard to the public health through poisoning or through the spread of disease by sewage, industrial fluids or waste.

**CONTINUOUS WASTE.** A drain from two or more similar adjacent fixtures connected to a single trap.

**CONTROL, LIMIT.** An automatic control responsive to changes in liquid flow or level, pressure, or temperature for limiting the operation of an *appliance*.

**CONTROL, PRIMARY SAFETY.** A safety control responsive directly to flame properties that senses the presence or absence of flame and, in event of ignition failure or unintentional flame extinguishment, automatically causes shutdown of mechanical equipment.



Documents

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## DEFINITIONS

**CONVECTOR.** A system-incorporating heating element in an enclosure in which air enters an opening below the heating element, is heated and leaves the enclosure through an opening located above the heating element.

**CORE.** The light-weight middle section of the structural insulated panel composed of foam plastic insulation, which provides the link between the two facing shells.

**CORROSION RESISTANCE.** The ability of a material to withstand deterioration of its surface or its properties when exposed to its environment.

**COURT.** A space, open and unobstructed to the sky, located at or above *grade* level on a *lot* and bounded on three or more sides by walls or a building.

**CRIPPLE WALL.** A framed wall extending from the top of the foundation to the underside of the floor framing of the first story *above grade plane*.

**CROSS CONNECTION.** Any connection between two otherwise separate piping systems whereby there may be a flow from one system to the other.

**DALLE GLASS.** A decorative composite glazing material made of individual pieces of glass that are embedded in a cast matrix of concrete or epoxy.

**DAMPER, VOLUME.** A device that will restrict, retard or direct the flow of air in any duct, or the products of combustion of heat-producing *equipment*, vent connector, vent or chimney.

**DEAD END.** A branch leading from a DWV system terminating at a *developed length* of 2 feet (610 mm) or more. Dead ends shall be prohibited except as an *approved* part of a rough-in for future connection.

**DEAD LOADS.** The weight of all materials of construction incorporated into the building, including but not limited to walls, floors, roofs, ceilings, stairways, built-in partitions, finishes, cladding, and other similarly incorporated architectural and structural items, and fixed service *equipment*.

**DECORATIVE GLASS.** A carved, leaded or Dalle glass or glazing material whose purpose is decorative or artistic, not functional; whose coloring, texture or other design qualities or components cannot be removed without destroying the glazing material; and whose surface, or assembly into which it is incorporated, is divided into segments.

**DESIGN PROFESSIONAL.** See “*Registered design professional*.”

**DEVELOPED LENGTH.** The length of a pipeline measured along the center line of the pipe and fittings.

**DIAMETER.** Unless specifically stated, the term “diameter” is the nominal diameter as designated by the *approved* material standard.

**DIAPHRAGM.** A horizontal or nearly horizontal system acting to transmit lateral forces to the vertical resisting elements. When the term “*diaphragm*” is used, it includes horizontal bracing systems.

**DILUTION AIR.** Air that enters a draft hood or draft regulator and mixes with flue gases.

**DIRECT-VENT APPLIANCE.** A fuel-burning *appliance* with a sealed combustion system that draws all air for combustion from the outside atmosphere and discharges all flue gases to the outside atmosphere.

**DRAFT.** The pressure difference existing between the *appliance* or any component part and the atmosphere, that causes a continuous flow of air and products of combustion through the gas passages of the *appliance* to the atmosphere.

**Induced draft.** The pressure difference created by the action of a fan, blower or ejector, that is located between the *appliance* and the chimney or vent termination.

**Natural draft.** The pressure difference created by a vent or chimney because of its height, and the temperature difference between the flue gases and the atmosphere.

**DRAFT HOOD.** A device built into an *appliance*, or a part of the vent connector from an *appliance*, which is designed to provide for the ready escape of the flue gases from the *appliance* in the event of no draft, backdraft or stoppage beyond the draft hood; prevent a backdraft from entering the *appliance*; and neutralize the effect of stack action of the chimney or gas vent on the operation of the *appliance*.

**DRAFT REGULATOR.** A device that functions to maintain a desired draft in the *appliance* by automatically reducing the draft to the desired value.

**DRAFT STOP.** A material, device or construction installed to restrict the movement of air within open spaces of concealed areas of building components such as crawl spaces, floor-ceiling assemblies, roof-ceiling assemblies and *attics*.

**DRAIN.** Any pipe that carries soil and water-borne wastes in a building drainage system.

**DRAINAGE FITTING.** A pipe fitting designed to provide connections in the drainage system that have provisions for establishing the desired slope in the system. These fittings are made from a variety of both metals and plastics. The methods of coupling provide for required slope in the system (see “*Durham fitting*”).

**DUCT SYSTEM.** A continuous passageway for the transmission of air which, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling *equipment* and *appliances*.

**DURHAM FITTING.** A special type of drainage fitting for use in the durham systems installations in which the joints are made with recessed and tapered threaded fittings, as opposed to bell and spigot lead/oakum or solvent/cemented or soldered joints. The tapping is at an angle (not 90 degrees) to provide for proper slope in otherwise rigid connections.

**DURHAM SYSTEM.** A term used to describe soil or waste systems where all piping is of threaded pipe, tube or other such rigid construction using recessed drainage fittings to correspond to the types of piping.

**DWELLING.** Any building that contains one or two *dwelling units* used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes.

**DWELLING UNIT.** A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking and sanitation.

**DWV.** Abbreviated term for drain, waste and vent piping as used in common plumbing practice.

**EFFECTIVE OPENING.** The minimum cross-sectional area at the point of water-supply discharge, measured or expressed in terms of diameter of a circle and if the opening is not circular, the diameter of a circle of equivalent cross-sectional area. (This is applicable to air gap.)

**ELBOW.** A pressure pipe fitting designed to provide an exact change in direction of a pipe run. An elbow provides a sharp turn in the flow path (see “Bend” and “Sweep”).

**EMERGENCY ESCAPE AND RESCUE OPENING.** An operable exterior window, door or similar device that provides for a means of escape and access for rescue in the event of an emergency.

**EQUIPMENT.** All piping, ducts, vents, control devices and other components of systems other than *appliances* that are permanently installed and integrated to provide control of environmental conditions for buildings. This definition shall also include other systems specifically regulated in this code.

**EQUIVALENT LENGTH.** For determining friction losses in a piping system, the effect of a particular fitting equal to the friction loss through a straight piping length of the same nominal diameter.

**ESCARPMENT.** With respect to topographic wind effects, a cliff or steep slope generally separating two levels or gently sloping areas.

**ESSENTIALLY NONTOXIC TRANSFER FLUIDS.** Fluids having a Gosselin rating of 1, including propylene glycol; mineral oil; polydimethyloil oxane; hydrochlorofluorocarbon, chlorofluorocarbon and hydrofluorocarbon refrigerants; and FDA-approved boiler water additives for steam boilers.

**ESSENTIALLY TOXIC TRANSFER FLUIDS.** Soil, water or gray water and fluids having a Gosselin rating of 2 or more including ethylene glycol, hydrocarbon oils, ammonia refrigerants and hydrazine.

**EVAPORATIVE COOLER.** A device used for reducing air temperature by the process of evaporating water into an airstream.

**EXCESS AIR.** Air that passes through the combustion chamber and the *appliance* flue in excess of that which is theoretically required for complete combustion.

**EXHAUST HOOD, FULL OPENING.** An exhaust hood with an opening at least equal to the diameter of the connecting vent.

**EXISTING INSTALLATIONS.** Any plumbing system regulated by this code that was legally installed prior to the effective date of this code, or for which a *permit* to install has been issued.

**EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS).** EIFS are nonstructural, nonload-bearing *exterior wall* cladding systems that consist of an insulation board attached

either adhesively or mechanically, or both, to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

**EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) WITH DRAINAGE.** An EIFS that incorporates a means of drainage applied over a water-resistive barrier.

**EXTERIOR WALL.** An above-grade wall that defines the exterior boundaries of a building. Includes between-floor spandrels, peripheral edges of floors, roof and *basement* knee walls, dormer walls, gable end walls, walls enclosing a mansard roof and *basement walls* with an average below-grade wall area that is less than 50 percent of the total opaque and nonopaque area of that enclosing side.

**FACING.** The wood structural panel facings that form the two outmost rigid layers of the structural insulated panel.

**FACTORY-BUILT CHIMNEY.** A *listed* and *labeled* chimney composed of factory-made components assembled in the field in accordance with the manufacturer's instructions and the conditions of the listing.

**FENESTRATION.** Skylights, roof windows, vertical windows (whether fixed or moveable); opaque doors; glazed doors; glass block; and combination opaque/glazed doors.

**FIBER-CEMENT SIDING.** A manufactured, fiber-reinforcing product made with an inorganic hydraulic or calcium silicate binder formed by chemical reaction and reinforced with discrete organic or inorganic nonasbestos fibers, or both. Additives which enhance manufacturing or product performance are permitted. Fiber-cement siding products have either smooth or textured faces and are intended for *exterior wall* and related applications.

**FIREBLOCKING.** Building materials or materials *approved* for use as fireblocking, installed to resist the free passage of flame to other areas of the building through concealed spaces.

**FIREPLACE.** An assembly consisting of a hearth and fire chamber of noncombustible material and provided with a chimney, for use with solid fuels.

**Factory-built fireplace.** A *listed* and *labeled* fireplace and chimney system composed of factory-made components, and assembled in the field in accordance with manufacturer's instructions and the conditions of the listing.

**Masonry chimney.** A field-constructed chimney composed of solid masonry units, bricks, stones or concrete.

**Masonry fireplace.** A field-constructed fireplace composed of solid masonry units, bricks, stones or concrete.

**FIREPLACE STOVE.** A free-standing, chimney-connected solid-fuel-burning heater designed to be operated with the fire chamber doors in either the open or closed position.

**FIREPLACE THROAT.** The opening between the top of the firebox and the smoke chamber.

**FIRE-RETARDANT-TREATED WOOD.** Pressure-treated lumber and plywood that exhibit reduced surface burning characteristics and resist propagation of fire.

**Other means during manufacture.** A process where the wood raw material is treated with a fire-retardant formulation while undergoing creation as a finished product.

**Pressure process.** A process for treating wood using an initial vacuum followed by the introduction of pressure above atmospheric.

**FIRE SEPARATION DISTANCE.** The distance measured from the building face to one of the following:

1. To the closest interior *lot line*; or
2. To the centerline of a street, an alley or public way; or
3. To an imaginary line between two buildings on the *lot*.

**FIXTURE.** See “Plumbing fixture.”

**FIXTURE BRANCH, DRAINAGE.** A drain serving two or more fixtures that discharges into another portion of the drainage system.

**FIXTURE BRANCH, WATER-SUPPLY.** A water-supply pipe between the fixture supply and a main water-distribution pipe or fixture group main.

**FIXTURE DRAIN.** The drain from the trap of a fixture to the junction of that drain with any other drain pipe.

**FIXTURE FITTING.**

**Supply fitting.** A fitting that controls the volume and/or directional flow of water and is either attached to or accessible from a fixture or is used with an open or atmospheric discharge.

**Waste fitting.** A combination of components that conveys the sanitary waste from the outlet of a fixture to the connection of the sanitary drainage system.

**FIXTURE GROUP, MAIN.** The main water-distribution pipe (or secondary branch) serving a plumbing fixture grouping such as a bath, kitchen or laundry area to which two or more individual fixture branch pipes are connected.

**FIXTURE SUPPLY.** The water-supply pipe connecting a fixture or fixture fitting to a fixture branch.

**FIXTURE UNIT, DRAINAGE (d.f.u.).** A measure of probable discharge into the drainage system by various types of plumbing fixtures, used to size DWV piping systems. The drainage fixture-unit value for a particular fixture depends on its volume rate of drainage discharge, on the time duration of a single drainage operation and on the average time between successive operations.

**FIXTURE UNIT, WATER-SUPPLY (w.s.f.u.).** A measure of the probable hydraulic demand on the water supply by various types of plumbing fixtures used to size water-piping systems. The water-supply fixture-unit value for a particular fixture depends on its volume rate of supply, on the time duration of a single supply operation and on the average time between successive operations.

**FLAME SPREAD.** The propagation of flame over a surface.

**FLAME SPREAD INDEX.** A comparative measure, expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time for a material tested in accordance with ASTM E 84.

**FLIGHT.** A continuous run of rectangular treads or winders or combination thereof from one landing to another.

**FLOOD-LEVEL RIM.** The edge of the receptor or fixture from which water overflows.

**FLOOR DRAIN.** A plumbing fixture for recess in the floor having a floor-level strainer intended for the purpose of the collection and disposal of waste water used in cleaning the floor and for the collection and disposal of accidental spillage to the floor.

**FLOOR FURNACE.** A self-contained furnace suspended from the floor of the space being heated, taking air for combustion from outside such space, and with means for lighting the *appliance* from such space.

**FLOW PRESSURE.** The static pressure reading in the water-supply pipe near the faucet or water outlet while the faucet or water outlet is open and flowing at capacity.

**FLUE.** See “Vent.”

**FLUE, APPLIANCE.** The passages within an *appliance* through which combustion products pass from the combustion chamber to the flue collar.

**FLUE COLLAR.** The portion of a fuel-burning *appliance* designed for the attachment of a draft hood, vent connector or venting system.

**FLUE GASES.** Products of combustion plus excess air in *appliance* flues or heat exchangers.

**FLUSH VALVE.** A device located at the bottom of a flush tank that is operated to flush water closets.

**FLUSHOMETER TANK.** A device integrated within an air accumulator vessel that is designed to discharge a predetermined quantity of water to fixtures for flushing purposes.

**FLUSHOMETER VALVE.** A flushometer valve is a device that discharges a predetermined quantity of water to fixtures for flushing purposes and is actuated by direct water pressure.

**FOAM BACKER BOARD.** Foam plastic used in siding applications where the foam plastic is a component of the siding.

**FOAM PLASTIC INSULATION.** A plastic that is intentionally expanded by the use of a foaming agent to produce a reduced-density plastic containing voids consisting of open or closed cells distributed throughout the plastic for thermal insulating or acoustic purposes and that has a density less than 20 pounds per cubic foot (320 kg/m<sup>3</sup>) unless it is used as interior trim.

**FOAM PLASTIC INTERIOR TRIM.** Exposed foam plastic used as picture molds, chair rails, crown moldings, baseboards, handrails, ceiling beams, door trim and window trim and similar decorative or protective materials used in fixed applications.

**FUEL-PIPING SYSTEM.** All piping, tubing, valves and fittings used to connect fuel utilization *equipment* to the point of fuel delivery.

**FULLWAY VALVE.** A valve that in the full open position has an opening cross-sectional area equal to a minimum of 85 percent of the cross-sectional area of the connecting pipe.

**FURNACE.** A vented heating *appliance* designed or arranged to discharge heated air into a *conditioned space* or through a duct or ducts.

**GLAZING AREA.** The interior surface area of all glazed fenestration, including the area of sash, curbing or other framing elements, that enclose *conditioned space*. Includes the area of glazed fenestration assemblies in walls bounding conditioned basements.

**GRADE.** The finished ground level adjoining the building at all *exterior walls*.

**GRADE FLOOR OPENING.** A window or other opening located such that the sill height of the opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening.

**GRADE, PIPING.** See “Slope.”

**GRADE PLANE.** A reference plane representing the average of the finished ground level adjoining the building at all *exterior walls*. Where the finished ground level slopes away from the *exterior walls*, the reference plane shall be established by the lowest points within the area between the building and the *lot line* or, where the *lot line* is more than 6 ft (1829 mm) from the building between the structure and a point 6 ft (1829 mm) from the building.

**GRIDDED WATER DISTRIBUTION SYSTEM.** A water distribution system where every water distribution pipe is interconnected so as to provide two or more paths to each fixture supply pipe.

**GROSS AREA OF EXTERIOR WALLS.** The normal projection of all *exterior walls*, including the area of all windows and doors installed therein.

**GROUND-SOURCE HEAT PUMP LOOP SYSTEM.** Piping buried in horizontal or vertical excavations or placed in a body of water for the purpose of transporting heat transfer liquid to and from a heat pump. Included in this definition are closed loop systems in which the liquid is recirculated and open loop systems in which the liquid is drawn from a well or other source.

**GUARD.** A building component or a system of building components located near the open sides of elevated walking surfaces that minimizes the possibility of a fall from the walking surface to the lower level.

**HABITABLE SPACE.** A space in a building for living, sleeping, eating or cooking. Bathrooms, toilet rooms, closets, halls, storage or utility spaces and similar areas are not considered *habitable spaces*.

**HANDRAIL.** A horizontal or sloping rail intended for grasping by the hand for guidance or support.

**HANGERS.** See “Supports.”

**HAZARDOUS LOCATION.** Any location considered to be a fire hazard for flammable vapors, dust, combustible fibers or other highly combustible substances.

**HEAT PUMP.** An *appliance* having heating or heating/cooling capability and that uses refrigerants to extract heat from air, liquid or other sources.

**HEATING DEGREE DAYS (HDD).** The sum, on an annual basis, of the difference between 65°F (18°C) and the mean temperature for each day as determined from “NOAA Annual Degree Days to Selected Bases Derived from the 1960-1990 Normals” or other weather data sources acceptable to the code official.

**HEIGHT, BUILDING.** The vertical distance from *grade plane* to the average height of the highest roof surface.

**HEIGHT, STORY.** The vertical distance from top to top of two successive tiers of beams or finished floor surfaces; and, for the topmost *story*, from the top of the floor finish to the top of the ceiling joists or, where there is not a ceiling, to the top of the roof rafters.

**HIGH-EFFICACY LAMPS.** Compact fluorescent lamps, T-8 or smaller diameter linear fluorescent lamps or lamps with a minimum efficacy of:

1. 60 lumens per watt for lamps over 40 watts.
2. 50 lumens per watt for lamps over 15 watts to 40 watts.
3. 40 lumens per watt for lamps 15 watts or less.

**HIGH-TEMPERATURE (H.T.) CHIMNEY.** A high temperature chimney complying with the requirements of UL 103. A Type H.T. chimney is identifiable by the markings “Type H.T.” on each chimney pipe section.

**HILL.** With respect to topographic wind effects, a land surface characterized by strong relief in any horizontal direction.

**HORIZONTAL BRANCH, DRAINAGE.** A drain pipe extending laterally from a soil or waste stack or *building drain*, that receives the discharge from one or more *fixture drains*.

**HORIZONTAL PIPE.** Any pipe or fitting that makes an angle of less than 45 degrees (0.79 rad) with the horizontal.

**HOT WATER.** Water at a temperature greater than or equal to 110°F (43°C).

**HURRICANE-PRONE REGIONS.** Areas vulnerable to hurricanes, defined as the U.S. Atlantic Ocean and Gulf of Mexico coasts where the basic wind speed is greater than 90 miles per hour (40 m/s), and Hawaii, Puerto Rico, Guam, Virgin Islands, and America Samoa.

**HYDROGEN GENERATING APPLIANCE.** A self-contained package or factory-matched packages of integrated systems for generating gaseous hydrogen. Hydrogen generating *appliances* utilize electrolysis, reformation, chemical, or other processes to generate hydrogen.

**IGNITION SOURCE.** A flame, spark or hot surface capable of igniting flammable vapors or fumes. Such sources include *appliance* burners, burner ignitions and electrical switching devices.

**INDIRECT WASTE PIPE.** A waste pipe that discharges into the drainage system through an air gap into a trap, fixture or receptor.

**INDIVIDUAL SEWAGE DISPOSAL SYSTEM.** A system for disposal of sewage by means of a septic tank or mechanical treatment, designed for use apart from a public sewer to serve a single establishment or building.

## DEFINITIONS

**INDIVIDUAL VENT.** A pipe installed to vent a single-*fixture drain* that connects with the vent system above or terminates independently outside the building.

**INDIVIDUAL WATER SUPPLY.** A supply other than an *approved* public water supply that serves one or more families.

**INSULATING CONCRETE FORM (ICF).** A concrete forming system using stay-in-place forms of rigid foam plastic insulation, a hybrid of cement and foam insulation, a hybrid of cement and wood chips, or other insulating material for constructing cast-in-place concrete walls.

**INSULATING SHEATHING.** An insulating board having a minimum thermal resistance of R-2 of the core material.

**JURISDICTION.** The governmental unit that has adopted this code under due legislative authority.

**KITCHEN.** Kitchen shall mean an area used, or designated to be used, for the preparation of food.

**LABEL.** An identification applied on a product by the manufacturer which contains the name of the manufacturer, the function and performance characteristics of the product or material, and the name and identification of an *approved agency* and that indicates that the representative sample of the product or material has been tested and evaluated by an *approved agency*. (See also “Manufacturer’s designation” and “Mark.”)

**LABELED.** *Equipment*, materials or products to which have been affixed a *label*, seal, symbol or other identifying *mark* of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the *equipment*, material or product meets identified standards or has been tested and found suitable for a specified purpose.

**LIGHT-FRAME CONSTRUCTION.** A type of construction whose vertical and horizontal structural elements are primarily formed by a system of repetitive wood or cold-formed steel framing members.

**LISTED.** *Equipment*, materials, products or services included in a list published by an organization acceptable to the code official and concerned with evaluation of products or services that maintains periodic inspection of production of *listed equipment* or materials or periodic evaluation of services and whose listing states either that the *equipment*, material, product or service meets identified standards or has been tested and found suitable for a specified purpose.

**LIVE LOADS.** Those loads produced by the use and occupancy of the building or other structure and do not include construction or environmental loads such as wind load, snow load, rain load, earthquake load, flood load or dead load.

**LIVING SPACE.** Space within a *dwelling unit* utilized for living, sleeping, eating, cooking, bathing, washing and sanitation purposes.

**LOT.** A portion or parcel of land considered as a unit.

**LOT LINE.** A line dividing one *lot* from another, or from a street or any public place.

**MACERATING TOILET SYSTEMS.** A system comprised of a sump with macerating pump and with connections for a

water closet and other plumbing fixtures, that is designed to accept, grind and pump wastes to an *approved* point of discharge.

**MAIN.** The principal pipe artery to which branches may be connected.

**MAIN SEWER.** See “Public sewer.”

**MANIFOLD WATER DISTRIBUTION SYSTEMS.** A fabricated piping arrangement in which a large supply main is fitted with multiple branches in close proximity in which water is distributed separately to fixtures from each branch.

**MANUFACTURED HOME.** *Manufactured home* means a structure, transportable in one or more sections, which in the traveling mode is 8 body feet (2438 body mm) or more in width or 40 body feet (12 192 body mm) or more in length, or, when erected on site, is 320 square feet (30 m<sup>2</sup>) or more, and which is built on a permanent chassis and designed to be used as a *dwelling* with or without a permanent foundation when connected to the required utilities, and includes the plumbing, heating, air-conditioning and electrical systems contained therein; except that such term shall include any structure that meets all the requirements of this paragraph except the size requirements and with respect to which the manufacturer voluntarily files a certification required by the secretary (HUD) and complies with the standards established under this title. For mobile homes built prior to June 15, 1976, a *label* certifying compliance to the Standard for Mobile Homes, NFPA 501, in effect at the time of manufacture is required. For the purpose of these provisions, a mobile home shall be considered a *manufactured home*.

**MANUFACTURER’S DESIGNATION.** An identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules. (See also “*Mark*” and “*Label*.”)

**MANUFACTURER’S INSTALLATION INSTRUCTIONS.** Printed instructions included with *equipment* as part of the conditions of listing and labeling.

**MARK.** An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material. (See also “Manufacturer’s designation” and “*Label*.”)

**MASONRY CHIMNEY.** A field-constructed chimney composed of solid masonry units, bricks, stones or concrete.

**MASONRY HEATER.** A masonry heater is a solid fuel burning heating *appliance* constructed predominantly of concrete or solid masonry having a mass of at least 1,100 pounds (500 kg), excluding the chimney and foundation. It is designed to absorb and store a substantial portion of heat from a fire built in the firebox by routing exhaust gases through internal heat exchange channels in which the flow path downstream of the firebox includes at least one 180-degree (3.14-rad) change in flow direction before entering the chimney and which deliver heat by radiation through the masonry surface of the heater.

**MASONRY, SOLID.** Masonry consisting of solid masonry units laid contiguously with the joints between the units filled with mortar.

**MASONRY UNIT.** Brick, tile, stone, glass block or concrete block conforming to the requirements specified in Section 2103 of the *International Building Code*.

**Clay.** A building unit larger in size than a brick, composed of burned clay, shale, fire clay or mixtures thereof.

**Concrete.** A building unit or block larger in size than 12 inches by 4 inches by 4 inches (305 mm by 102 mm by 102 mm) made of cement and suitable aggregates.

**Glass.** Nonload-bearing masonry composed of glass units bonded by mortar.

**Hollow.** A masonry unit whose net cross-sectional area in any plane parallel to the loadbearing surface is less than 75 percent of its gross cross-sectional area measured in the same plane.

**Solid.** A masonry unit whose net cross-sectional area in every plane parallel to the loadbearing surface is 75 percent or more of its cross-sectional area measured in the same plane.

**MASS WALL.** Masonry or concrete walls having a mass greater than or equal to 30 pounds per square foot (146 kg/m<sup>2</sup>), solid wood walls having a mass greater than or equal to 20 pounds per square foot (98 kg/m<sup>2</sup>), and any other walls having a heat capacity greater than or equal to 6 Btu/ft<sup>2</sup> · °F [266 J/(m<sup>2</sup> · K)].

**MEAN ROOF HEIGHT.** The average of the roof eave height and the height to the highest point on the roof surface, except that eave height shall be used for roof angle of less than or equal to 10 degrees (0.18 rad).

**MECHANICAL DRAFT SYSTEM.** A venting system designed to remove flue or vent gases by mechanical means, that consists of an induced draft portion under nonpositive static pressure or a forced draft portion under positive static pressure.

**Forced-draft venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static pressure.

**Induced draft venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under nonpositive static vent pressure.

**Power venting system.** A portion of a venting system using a fan or other mechanical means to cause the removal of flue or vent gases under positive static vent pressure.

**MECHANICAL EXHAUST SYSTEM.** A system for removing air from a room or space by mechanical means.

**MECHANICAL SYSTEM.** A system specifically addressed and regulated in this code and composed of components, devices, *appliances* and *equipment*.

**METAL ROOF PANEL.** An interlocking metal sheet having a minimum installed weather exposure of at least 3 square feet (0.28 m<sup>2</sup>) per sheet.

**METAL ROOF SHINGLE.** An interlocking metal sheet having an installed weather exposure less than 3 square feet (0.28 m<sup>2</sup>) per sheet.

**MEZZANINE, LOFT.** An intermediate level or levels between the floor and ceiling of any *story* with an aggregate floor area of not more than one-third of the area of the room or space in which the level or levels are located.

**MODIFIED BITUMEN ROOF COVERING.** One or more layers of polymer modified asphalt sheets. The sheet materials shall be fully adhered or mechanically attached to the substrate or held in place with an *approved* ballast layer.

**MULTIPLE STATION SMOKE ALARM.** Two or more single station alarm devices that are capable of interconnection such that actuation of one causes all integral or separate audible alarms to operate.

**NATURAL DRAFT SYSTEM.** A venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.

**NATURALLY DURABLE WOOD.** The heartwood of the following species with the exception that an occasional piece with corner sapwood is permitted if 90 percent or more of the width of each side on which it occurs is heartwood.

**Decay resistant.** Redwood, cedar, black locust and black walnut.

**Termite resistant.** Alaska yellow cedar, redwood, Eastern red cedar and Western red cedar including all sapwood of Western red cedar.

**NONCOMBUSTIBLE MATERIAL.** Materials that pass the test procedure for defining noncombustibility of elementary materials set forth in ASTM E 136.

**NONCONDITIONED SPACE.** A space that is not a *conditioned space* by insulated walls, floors or ceilings.

**NOSING.** The leading edge of treads of stairs and of landings at the top of stairway flights.

**OCCUPIED SPACE.** The total area of all buildings or structures on any *lot* or parcel of ground projected on a horizontal plane, excluding permitted projections as allowed by this code.

**OFFSET.** A combination of fittings that makes two changes in direction bringing one section of the pipe out of line but into a line parallel with the other section.

**OWNER.** Any person, agent, firm or corporation having a legal or equitable interest in the property.

**PANEL THICKNESS.** Thickness of core plus two layers of structural wood panel facings.

**PELLET FUEL-BURNING APPLIANCE.** A closed combustion, vented *appliance* equipped with a fuel feed mechanism for burning processed pellets of solid fuel of a specified size and composition.

**PELLET VENT.** A vent *listed* and *labeled* for use with a *listed* pellet fuel-burning *appliance*.

**PERMIT.** An official document or certificate issued by the authority having *jurisdiction* that authorizes performance of a specified activity.

**PERSON.** An individual, heirs, executors, administrators or assigns, and also includes a firm, partnership or corporation, its

## DEFINITIONS

or their successors or assigns, or the agent of any of the aforesaid.

**PITCH.** See “Slope.”

**PLATFORM CONSTRUCTION.** A method of construction by which floor framing bears on load bearing walls that are not continuous through the *story* levels or floor framing.

**PLENUM.** A chamber that forms part of an air-circulation system other than the *occupied space* being conditioned.

**PLUMBING.** For the purpose of this code, plumbing refers to those installations, repairs, maintenance and *alterations* regulated by Chapters 25 through 33.

**PLUMBING APPLIANCE.** An energized household *appliance* with plumbing connections, such as a dishwasher, food-waste grinder, clothes washer or water heater.

**PLUMBING APPURTENANCE.** A device or assembly that is an adjunct to the basic plumbing system and demands no additional water supply nor adds any discharge load to the system. It is presumed that it performs some useful function in the operation, maintenance, servicing, economy or safety of the plumbing system. Examples include filters, relief valves and aerators.

**PLUMBING FIXTURE.** A receptor or device that requires both a water-supply connection and a discharge to the drainage system, such as water closets, lavatories, bathtubs and sinks. Plumbing *appliances* as a special class of fixture are further defined.

**PLUMBING SYSTEM.** Includes the water supply and distribution pipes, plumbing fixtures, supports and appurtenances; soil, waste and vent pipes; sanitary drains and *building sewers* to an *approved* point of disposal.

**POLLUTION.** An impairment of the quality of the potable water to a degree that does not create a hazard to the public health but that does adversely and unreasonably affect the aesthetic qualities of such potable water for domestic use.

**PORTABLE-FUEL-CELL APPLIANCE.** A fuel cell generator of electricity, which is not fixed in place. A portable-fuel-cell *appliance* utilizes a cord and plug connection to a grid-isolated load and has an integral fuel supply.

**POSITIVE ROOF DRAINAGE.** The drainage condition in which consideration has been made for all loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation.

**POTABLE WATER.** Water free from impurities present in amounts sufficient to cause disease or harmful physiological effects and conforming in bacteriological and chemical quality to the requirements of the public health authority having *jurisdiction*.

**PRECAST CONCRETE.** A structural concrete element cast elsewhere than its final position in the structure.

**PRECAST CONCRETE FOUNDATION WALLS.** Preengineered, precast concrete wall panels that are designed to withstand specified stresses and used to build below-grade foundations.

**PRESSURE-RELIEF VALVE.** A pressure-actuated valve held closed by a spring or other means and designed to automatically relieve pressure at the pressure at which it is set.

**PUBLIC SEWER.** A common sewer directly controlled by public authority.

**PUBLIC WATER MAIN.** A water-supply pipe for public use controlled by public authority.

**PUBLIC WAY.** Any street, alley or other parcel of land open to the outside air leading to a public street, which has been deeded, dedicated or otherwise permanently appropriated to the public for public use and that has a clear width and height of not less than 10 feet (3048 mm).

**PURGE.** To clear of air, gas or other foreign substances.

**QUICK-CLOSING VALVE.** A valve or faucet that closes automatically when released manually or controlled by mechanical means for fast-action closing.

**R-VALUE, THERMAL RESISTANCE.** The inverse of the time rate of heat flow through a *building thermal envelope* element from one of its bounding surfaces to the other for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ( $h \cdot ft^2 \cdot ^\circ F/Btu$ ).

**RAMP.** A walking surface that has a running slope steeper than 1 unit vertical in 20 units horizontal (5-percent slope).

**RECEPTOR.** A fixture or device that receives the discharge from indirect waste pipes.

**REFRIGERANT.** A substance used to produce refrigeration by its expansion or evaporation.

**REFRIGERANT COMPRESSOR.** A specific machine, with or without accessories, for compressing a given refrigerant vapor.

**REFRIGERATING SYSTEM.** A combination of interconnected parts forming a closed circuit in which refrigerant is circulated for the purpose of extracting, then rejecting, heat. A direct refrigerating system is one in which the evaporator or condenser of the refrigerating system is in direct contact with the air or other substances to be cooled or heated. An indirect refrigerating system is one in which a secondary coolant cooled or heated by the refrigerating system is circulated to the air or other substance to be cooled or heated.

**REGISTERED DESIGN PROFESSIONAL.** An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or *jurisdiction* in which the project is to be constructed.

**RELIEF VALVE, VACUUM.** A device to prevent excessive buildup of vacuum in a pressure vessel.

**REPAIR.** The reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

**REROOFING.** The process of recovering or replacing an existing roof covering. See “Roof recover.”

**RETURN AIR.** Air removed from an *approved conditioned space* or location and recirculated or exhausted.

**RIDGE.** With respect to topographic wind effects, an elongated crest of a hill characterized by strong relief in two directions.

**RISER.** A water pipe that extends vertically one full *story* or more to convey water to branches or to a group of fixtures.

**ROOF ASSEMBLY.** A system designed to provide weather protection and resistance to design loads. The system consists of a roof covering and roof deck or a single component serving as both the roof covering and the roof deck. A roof assembly includes the roof deck, vapor retarder, substrate or thermal barrier, insulation, vapor retarder, and roof covering.

**ROOF COVERING.** The covering applied to the roof deck for weather resistance, fire classification or appearance.

**ROOF COVERING SYSTEM.** See “Roof assembly.”

**ROOF DECK.** The flat or sloped surface not including its supporting members or vertical supports.

**ROOF RECOVER.** The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

**ROOF REPAIR.** Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

**ROOFTOP STRUCTURE.** An enclosed structure on or above the roof of any part of a building.

**ROOM HEATER.** A freestanding heating *appliance* installed in the space being heated and not connected to ducts.

**ROUGH-IN.** The installation of all parts of the plumbing system that must be completed prior to the installation of fixtures. This includes DWV, water supply and built-in fixture supports.

**RUNNING BOND.** The placement of masonry units such that head joints in successive courses are horizontally offset at least one-quarter the unit length.

**SANITARY SEWER.** A sewer that carries sewage and excludes storm, surface and groundwater.

**SCUPPER.** An opening in a wall or parapet that allows water to drain from a roof.

**SEISMIC DESIGN CATEGORY (SDC).** A classification assigned to a structure based on its occupancy category and the severity of the design earthquake ground motion at the site.

**SEPTIC TANK.** A water-tight receptor that receives the discharge of a building sanitary drainage system and is constructed so as to separate solids from the liquid, digest organic matter through a period of detention, and allow the liquids to discharge into the soil outside of the tank through a system of open joint or perforated piping or a seepage pit.

**SEWAGE.** Any liquid waste containing animal matter, vegetable matter or other impurity in suspension or solution.

**SEWAGE PUMP.** A permanently installed mechanical device for removing sewage or liquid waste from a sump.

**SHALL.** The term, when used in the code, is construed as mandatory.

**SHEAR WALL.** A general term for walls that are designed and constructed to resist racking from seismic and wind by use of masonry, concrete, cold-formed steel or wood framing in

accordance with Chapter 6 of this code and the associated limitations in Section R301.2 of this code.

**SIDE VENT.** A vent connecting to the drain pipe through a fitting at an angle less than 45 degrees (0.79 rad) to the horizontal.

**SINGLE PLY MEMBRANE.** A roofing membrane that is field applied using one layer of membrane material (either homogeneous or composite) rather than multiple layers.

**SINGLE STATION SMOKE ALARM.** An assembly incorporating the detector, control *equipment* and alarm sounding device in one unit that is operated from a power supply either in the unit or obtained at the point of installation.

**SKYLIGHT AND SLOPED GLAZING.** See Section R308.6.1.

**SKYLIGHT, UNIT.** See Section R308.6.1.

**SLIP JOINT.** A mechanical-type joint used primarily on fixture traps. The joint tightness is obtained by compressing a friction-type washer such as rubber, nylon, neoprene, lead or special packing material against the pipe by the tightening of a (slip) nut.

**SLOPE.** The fall (pitch) of a line of pipe in reference to a horizontal plane. In drainage, the slope is expressed as the fall in units vertical per units horizontal (percent) for a length of pipe.

**SMOKE-DEVELOPED INDEX.** A comparative measure, expressed as a dimensionless number, derived from measurements of smoke obscuration versus time for a material tested in accordance with ASTM E 84.

**SOIL STACK OR PIPE.** A pipe that conveys sewage containing fecal material.

**SOLAR HEAT GAIN COEFFICIENT (SHGC).** The solar heat gain through a fenestration or glazing assembly relative to the incident solar radiation ( $\text{Btu/h} \cdot \text{ft}^2 \cdot ^\circ\text{F}$ ).

**SOLID MASONRY.** Load-bearing or nonload-bearing construction using masonry units where the net cross-sectional area of each unit in any plane parallel to the bearing surface is not less than 75 percent of its gross cross-sectional area. Solid masonry units shall conform to ASTM C 55, C 62, C 73, C 145 or C 216.

**SPLINE.** A strip of wood structural panel cut from the same material used for the panel facings, used to connect two structural insulated panels. The strip (spline) fits into a groove cut into the vertical edges of the two structural insulated panels to be joined. Splines are used behind each facing of the structural insulated panels being connected as shown in Figure R613.8.

**STACK.** Any main vertical DWV line, including offsets, that extends one or more stories as directly as possible to its vent terminal.

**STACK BOND.** The placement of masonry units in a bond pattern is such that head joints in successive courses are vertically aligned. For the purpose of this code, requirements for stack bond shall apply to all masonry laid in other than running bond.

**STACK VENT.** The extension of soil or waste stack above the highest horizontal drain connected

## DEFINITIONS

**STACK VENTING.** A method of venting a fixture or fixtures through the soil or waste stack without individual fixture vents.

**STAIR.** A change in elevation, consisting of one or more risers.

**STAIRWAY.** One or more flights of stairs, either interior or exterior, with the necessary landings and platforms connecting them to form a continuous and uninterrupted passage from one level to another within or attached to a building, porch or deck.

**STANDARD TRUSS.** Any construction that does not permit the roof/ceiling insulation to achieve the required R-value over the *exterior walls*.

**STATIONARY FUEL CELL POWER PLANT.** A self-contained package or factory-matched packages which constitute an automatically-operated assembly of integrated systems for generating useful electrical energy and recoverable thermal energy that is permanently connected and fixed in place.

**STORM SEWER, DRAIN.** A pipe used for conveying rain-water, surface water, subsurface water and similar liquid waste.

**STORY.** That portion of a building included between the upper surface of a floor and the upper surface of the floor or roof next above.

**STORY ABOVE GRADE PLANE.** Any *story* having its finished floor surface entirely above *grade plane*, except that a *basement* shall be considered as a *story above grade plane* where the finished surface of the floor above the *basement* meets any one of the following:

1. Is more than 6 feet (1829 mm) *above grade plane*.
2. Is more than 6 feet (1829 mm) above the finished ground level for more than 50 percent of the total building perimeter.
3. Is more than 12 feet (3658 mm) above the finished ground level at any point.

**STRUCTURAL INSULATED PANEL (SIP).** A structural sandwich panel that consists of a light-weight foam plastic core securely laminated between two thin, rigid wood structural panel facings.

**STRUCTURE.** That which is built or constructed.

**SUBSOIL DRAIN.** A drain that collects subsurface water or seepage water and conveys such water to a place of disposal.

**SUMP.** A tank or pit that receives sewage or waste, located below the normal *grade* of the gravity system and that must be emptied by mechanical means.

**SUMP PUMP.** A pump installed to empty a sump. These pumps are used for removing storm water only. The pump is selected for the specific head and volume of the load and is usually operated by level controllers.

**SUNROOM.** A one-story structure attached to a *dwelling* with a *glazing area* in excess of 40 percent of the gross area of the structure's *exterior walls* and roof.

**SUPPLY AIR.** Air delivered to a *conditioned space* through ducts or plenums from the heat exchanger of a heating, cooling and ventilating system.

**SUPPORTS.** Devices for supporting, hanging and securing pipes, fixtures and *equipment*.

**SWEEP.** A drainage fitting designed to provide a change in direction of a drain pipe of less than the angle specified by the amount necessary to establish the desired slope of the line. Sweeps provide a longer turning radius than bends and a less turbulent flow pattern (see "Bend" and "Elbow").

**TEMPERATURE- AND PRESSURE-RELIEF (T AND P) VALVE.** A combination relief valve designed to function as both a temperature-relief and pressure-relief valve.

**TEMPERATURE-RELIEF VALVE.** A temperature-actuated valve designed to discharge automatically at the temperature at which it is set.

**TERMITE-RESISTANT MATERIAL.** Pressure-preservative treated wood in accordance with the AWPA standards in Section R318.1, naturally durable termite-resistant wood, steel, concrete, masonry or other *approved* material.

**THERMAL ISOLATION.** Physical and space conditioning separation from *conditioned space(s)* consisting of existing or new walls, doors and/or windows. The *conditioned space(s)* shall be controlled as separate zones for heating and cooling or conditioned by separate *equipment*.

**THERMAL RESISTANCE, R-VALUE.** The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other for a unit temperature difference between the two surfaces, under steady state conditions, per unit area ( $\text{h} \cdot \text{ft}^2 \cdot ^\circ\text{F}/\text{Btu}$ ).

**THERMAL TRANSMITTANCE, U-FACTOR.** The coefficient of heat transmission (air to air) through a building envelope component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films ( $\text{Btu}/\text{h} \cdot \text{ft}^2 \cdot ^\circ\text{F}$ ).

**TOWNHOUSE.** A single-family *dwelling unit* constructed in a group of three or more attached units in which each unit extends from foundation to roof and with a *yard* or public way on at least two sides.

**TRAP.** A fitting, either separate or built into a fixture, that provides a liquid seal to prevent the emission of sewer gases without materially affecting the flow of sewage or waste water through it.

**TRAP ARM.** That portion of a *fixture drain* between a trap weir and the vent fitting.

**TRAP PRIMER.** A device or system of piping to maintain a water seal in a trap, typically installed where infrequent use of the trap would result in evaporation of the trap seal, such as floor drains.

**TRAP SEAL.** The trap seal is the maximum vertical depth of liquid that a trap will retain, measured between the crown weir and the top of the dip of the trap.

**TRIM.** Picture molds, chair rails, baseboards, handrails, door and window frames, and similar decorative or protective materials used in fixed applications.

**TRUSS DESIGN DRAWING.** The graphic depiction of an individual truss, which describes the design and physical characteristics of the truss.

**TYPE L VENT.** A *listed* and *labeled* vent conforming to UL 641 for venting oil-burning *appliances listed* for use with Type L vents or with gas *appliances listed* for use with Type B vents.

**U-FACTOR, THERMAL TRANSMITTANCE.** The coefficient of heat transmission (air to air) through a building envelope component or assembly, equal to the time rate of heat flow per unit area and unit temperature difference between the warm side and cold side air films ( $\text{Btu/h} \cdot \text{ft}^2 \cdot ^\circ\text{F}$ ).

➔ **UNDERLAYMENT.** One or more layers of felt, sheathing paper, nonbituminous saturated felt, or other *approved* material over which a roof covering, with a slope of 2 to 12 (17-percent slope) or greater, is applied.

➔ **VACUUM BREAKERS.** A device which prevents back-siphonage of water by admitting atmospheric pressure through ports to the discharge side of the device.

**VAPOR PERMEABLE MEMBRANE.** A material or covering having a permance rating of 5 perms ( $2.9 \cdot 10^{-10} \text{ kg/Pa} \cdot \text{s} \cdot \text{m}^2$ ) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E 96. A vapor permeable material permits the passage of moisture vapor.

**VAPOR RETARDER CLASS.** A measure of the ability of a material or assembly to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method with Procedure A of ASTM E 96 as follows:

Class I: 0.1 perm or less

Class II:  $0.1 < \text{perm} \leq 1.0$  perm

Class III:  $1.0 < \text{perm} \leq 10$  perm

**VEHICULAR ACCESS DOOR.** A door that is used primarily for vehicular traffic at entrances of buildings such as garages and parking lots, and that is not generally used for pedestrian traffic.

**VENT.** A passageway for conveying flue gases from fuel-fired *appliances*, or their vent connectors, to the outside atmosphere.

**VENT COLLAR.** See “Flue collar.”

**VENT CONNECTOR.** That portion of a venting system which connects the flue collar or draft hood of an *appliance* to a vent.

**VENT DAMPER DEVICE, AUTOMATIC.** A device intended for installation in the venting system, in the outlet of an individual, automatically operated fuel burning *appliance* and that is designed to open the venting system automatically when the *appliance* is in operation and to close off the venting system automatically when the *appliance* is in a standby or shutdown condition.

**VENT GASES.** Products of combustion from fuel-burning *appliances*, plus excess air and dilution air, in the venting system above the draft hood or draft regulator.

**VENT STACK.** A vertical vent pipe installed to provide circulation of air to and from the drainage system and which extends through one or more stories.

**VENT SYSTEM.** Piping installed to equalize pneumatic pressure in a drainage system to prevent trap seal loss or blow-back due to siphonage or back pressure.

**VENTILATION.** The natural or mechanical process of supplying conditioned or unconditioned air to, or removing such air from, any space.

**VENTING.** Removal of combustion products to the outdoors.

**VENTING SYSTEM.** A continuous open passageway from the flue collar of an *appliance* to the outside atmosphere for the purpose of removing flue or vent gases. A venting system is usually composed of a vent or a chimney and vent connector, if used, assembled to form the open passageway.

**VERTICAL PIPE.** Any pipe or fitting that makes an angle of 45 degrees (0.79 rad) or more with the horizontal.

**VINYL SIDING.** A shaped material, made principally from rigid polyvinyl chloride (PVC), that is used to cover exterior walls of buildings.

**WALL, RETAINING.** A wall not laterally supported at the top, that resists lateral soil load and other imposed loads.

**WALLS.** Walls shall be defined as follows:

**Load-bearing wall** is a wall supporting any vertical load in addition to its own weight.

**Nonbearing wall** is a wall which does not support vertical loads other than its own weight.

**WASTE.** Liquid-borne waste that is free of fecal matter.

**WASTE PIPE OR STACK.** Piping that conveys only liquid sewage not containing fecal material.

**WATER-DISTRIBUTION SYSTEM.** Piping which conveys water from the service to the plumbing fixtures, *appliances*, appurtenances, *equipment*, devices or other systems served, including fittings and control valves.

**WATER HEATER.** Any heating *appliance* or *equipment* that heats potable water and supplies such water to the potable hot water distribution system.

**WATER MAIN.** A water-supply pipe for public use.

**WATER OUTLET.** A valved discharge opening, including a hose bibb, through which water is removed from the potable water system supplying water to a plumbing fixture or plumbing *appliance* that requires either an air gap or backflow prevention device for protection of the supply system.

**WATER-RESISTIVE BARRIER.** A material behind an *exterior wall* covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the *exterior wall* assembly.

**WATER-SERVICE PIPE.** The outside pipe from the water main or other source of potable water supply to the water-distribution system inside the building, terminating at the service valve.

**WATER-SUPPLY SYSTEM.** The water-service pipe, the water-distributing pipes and the necessary connecting pipes, fittings, control valves and all appurtenances in or adjacent to the building or premises.

## DEFINITIONS

**WET VENT.** A vent that also receives the discharge of wastes from other fixtures.

**WIND-BORNE DEBRIS REGION.** Areas within *hurricane-prone regions* within one mile of the coastal mean high water line where the basic wind speed is 110 miles per hour (49 m/s) or greater; or where the basic wind speed is equal to or greater than 120 miles per hour (54 m/s); or Hawaii.

**WINDER.** A tread with nonparallel edges.

**WOOD/PLASTIC COMPOSITE.** A composite material made primarily from wood or cellulose-based materials and plastic.

**WOOD STRUCTURAL PANEL.** A panel manufactured from veneers; or wood strands or wafers; bonded together with waterproof synthetic resins or other suitable bonding systems. Examples of wood structural panels are plywood, OSB or composite panels.

**YARD.** An open space, other than a court, unobstructed from the ground to the sky, except where specifically provided by this code, on the *lot* on which a building is situated.

# Part III—Building Planning and Construction

## CHAPTER 3 BUILDING PLANNING

### SECTION R301 DESIGN CRITERIA

**R301.1 Application.** Buildings and structures, and all parts thereof, shall be constructed to safely support all loads, including dead loads, live loads, roof loads, flood loads, snow loads, wind loads and seismic loads as prescribed by this code. The construction of buildings and structures in accordance with the provisions of this code shall result in a system that provides a complete load path that meets all requirements for the transfer of all loads from their point of origin through the load-resisting elements to the foundation. Buildings and structures constructed as prescribed by this code are deemed to comply with the requirements of this section.

**R301.1.1 Alternative provisions.** As an alternative to the requirements in Section R301.1 the following standards are permitted subject to the limitations of this code and the limitations therein. Where engineered design is used in conjunction with these standards, the design shall comply with the *International Building Code*.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual* (WFCM).
2. American Iron and Steel Institute (AISI) *Standard for Cold-Formed Steel Framing—Prescriptive Method for One- and Two-Family Dwellings* (AISI S230).
3. ICC-400 *Standard on the Design and Construction of Log Structures*.

**R301.1.2 Construction systems.** The requirements of this code are based on platform and balloon-frame construction for light-frame buildings. The requirements for concrete and masonry buildings are based on a balloon framing system. Other framing systems must have equivalent detailing to ensure force transfer, continuity and compatible deformations.

**R301.1.3 Engineered design.** When a building of otherwise conventional construction contains structural elements exceeding the limits of Section R301 or otherwise not conforming to this code, these elements shall be designed in accordance with accepted engineering practice. The extent of such design need only demonstrate compliance of nonconventional elements with other applicable provisions and shall be compatible with the performance of the conventional framed system. Engineered design in accordance with the *International Building Code* is permitted for all buildings and structures, and parts thereof, included in the scope of this code.

**R301.2 Climatic and geographic design criteria.** Buildings shall be constructed in accordance with the provisions of this

code as limited by the provisions of this section. Additional criteria shall be established by the local *jurisdiction* and set forth in Table R301.2(1).

**R301.2.1 Wind limitations.** Buildings and portions thereof shall be limited by wind speed, as defined in Table R301.2(1) and construction methods in accordance with this code. Basic wind speeds shall be determined from Figure R301.2(4). Where different construction methods and structural materials are used for various portions of a building, the applicable requirements of this section for each portion shall apply. Where loads for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors are not otherwise specified, the loads listed in Table R301.2(2) adjusted for height and exposure using Table R301.2(3) shall be used to determine design load performance requirements for wall coverings, curtain walls, roof coverings, exterior windows, skylights, garage doors and exterior doors. Asphalt shingles shall be designed for wind speeds in accordance with Section R905.2.6.

**R301.2.1.1 Design criteria.** In regions where the basic wind speeds from Figure R301.2(4) equal or exceed 100 miles per hour (45 m/s) in *hurricane-prone regions*, or 110 miles per hour (49 m/s) elsewhere, the design of buildings shall be in accordance with one of the following methods. The elements of design not addressed by those documents in Items 1 through 4 shall be in accordance with this code.

1. American Forest and Paper Association (AF&PA) *Wood Frame Construction Manual for One- and Two-Family Dwellings* (WFCM); or
2. International Code Council (ICC) *Standard for Residential Construction in High Wind Regions* (ICC-600); or
3. *Minimum Design Loads for Buildings and Other Structures* (ASCE-7); or
4. American Iron and Steel Institute (AISI), *Standard for Cold-Formed Steel Framing—Prescriptive Method For One- and Two-Family Dwellings* (AISI S230).
5. Concrete construction shall be designed in accordance with the provisions of this code.
6. Structural insulated panel (SIP) walls shall be designed in accordance with the provisions of this code.

**TABLE R301.2(1)**  
**CLIMATIC AND GEOGRAPHIC DESIGN CRITERIA**

| GROUND<br>SNOW<br>LOAD | WIND DESIGN                 |                                     | SEISMIC<br>DESIGN<br>CATEGORY <sup>f</sup> | SUBJECT TO DAMAGE FROM  |                                  |                      | WINTER<br>DESIGN<br>TEMP <sup>e</sup> | ICE BARRIER<br>UNDERLAYMENT<br>REQUIRED <sup>h</sup> | FLOOD<br>HAZARDS <sup>g</sup> | AIR<br>FREEZING<br>INDEX <sup>i</sup> | MEAN<br>ANNUAL<br>TEMP <sup>j</sup> |
|------------------------|-----------------------------|-------------------------------------|--------------------------------------------|-------------------------|----------------------------------|----------------------|---------------------------------------|------------------------------------------------------|-------------------------------|---------------------------------------|-------------------------------------|
|                        | Speed <sup>d</sup><br>(mph) | Topographic<br>effects <sup>k</sup> |                                            | Weathering <sup>a</sup> | Frost line<br>depth <sup>b</sup> | Termite <sup>c</sup> |                                       |                                                      |                               |                                       |                                     |
|                        |                             |                                     |                                            |                         |                                  |                      |                                       |                                                      |                               |                                       |                                     |

For SI: 1 pound per square foot = 0.0479 kPa, 1 mile per hour = 0.447 m/s.

- a. Weathering may require a higher strength concrete or grade of masonry than necessary to satisfy the structural requirements of this code. The weathering column shall be filled in with the weathering index (i.e., “negligible,” “moderate” or “severe”) for concrete as determined from the Weathering Probability Map [Figure R301.2(3)]. The grade of masonry units shall be determined from ASTM C 34, C 55, C 62, C 73, C 90, C 129, C 145, C 216 or C 652.
- b. The frost line depth may require deeper footings than indicated in Figure R403.1(1). The jurisdiction shall fill in the frost line depth column with the minimum depth of footing below finish grade.
- c. The jurisdiction shall fill in this part of the table to indicate the need for protection depending on whether there has been a history of local subterranean termite damage.
- d. The jurisdiction shall fill in this part of the table with the wind speed from the basic wind speed map [Figure R301.2(4)]. Wind exposure category shall be determined on a site-specific basis in accordance with Section R301.2.1.4.
- e. The outdoor design dry-bulb temperature shall be selected from the columns of 97<sup>1</sup>/<sub>2</sub>-percent values for winter from Appendix D of the *International Plumbing Code*. Deviations from the Appendix D temperatures shall be permitted to reflect local climates or local weather experience as determined by the building official.
- f. The jurisdiction shall fill in this part of the table with the seismic design category determined from Section R301.2.2.1.
- g. The jurisdiction shall fill in this part of the table with (a) the date of the jurisdiction’s entry into the National Flood Insurance Program (date of adoption of the first code or ordinance for management of flood hazard areas), (b) the date(s) of the Flood Insurance Study and (c) the panel numbers and dates of all currently effective FIRMs and FBFMs or other flood hazard map adopted by the authority having jurisdiction, as amended.
- h. In accordance with Sections R905.2.7.1, R905.4.3.1, R905.5.3.1, R905.6.3.1, R905.7.3.1 and R905.8.3.1, where there has been a history of local damage from the effects of ice damming, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall fill in this part of the table with “NO.”
- i. The jurisdiction shall fill in this part of the table with the 100-year return period air freezing index (BF-days) from Figure R403.3(2) or from the 100-year (99%) value on the National Climatic Data Center data table “Air Freezing Index- USA Method (Base 32°)” at [www.ncdc.noaa.gov/fpsf.html](http://www.ncdc.noaa.gov/fpsf.html).
- j. The jurisdiction shall fill in this part of the table with the mean annual temperature from the National Climatic Data Center data table “Air Freezing Index-USA Method (Base 32°F)” at [www.ncdc.noaa.gov/fpsf.html](http://www.ncdc.noaa.gov/fpsf.html).
- k. In accordance with Section R301.2.1.5, where there is local historical data documenting structural damage to buildings due to topographic wind speed-up effects, the jurisdiction shall fill in this part of the table with “YES.” Otherwise, the jurisdiction shall indicate “NO” in this part of the table.

**TABLE R301.2(2)**  
**COMPONENT AND CLADDING LOADS FOR A BUILDING WITH A MEAN**  
**ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B (psf)<sup>a, b, c, d, e</sup>**

|                         | ZONE | EFFECTIVE<br>WIND<br>AREA<br>(feet <sup>2</sup> ) | BASIC WIND SPEED (mph—3-second gust) |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |        |      |        |
|-------------------------|------|---------------------------------------------------|--------------------------------------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|--------|------|--------|
|                         |      |                                                   | 85                                   |       | 90   |       | 100  |       | 105  |       | 110  |       | 120  |       | 125  |       | 130  |       | 140  |       | 145  |       | 150  |        | 170  |        |
| Roof > 0 to 10 degrees  | 1    | 10                                                | 10.0                                 | -13.0 | 10.0 | -14.6 | 10.0 | -18.0 | 10.0 | -19.8 | 10.0 | -21.8 | 10.5 | -25.9 | 11.4 | -28.1 | 12.4 | -30.4 | 14.3 | -35.3 | 15.4 | -37.8 | 16.5 | -40.5  | 21.1 | -52.0  |
|                         | 1    | 20                                                | 10.0                                 | -12.7 | 10.0 | -14.2 | 10.0 | -17.5 | 10.0 | -19.3 | 10.0 | -21.2 | 10.0 | -25.2 | 10.7 | -27.4 | 11.6 | -29.6 | 13.4 | -34.4 | 14.4 | -36.9 | 15.4 | -39.4  | 19.8 | -50.7  |
|                         | 1    | 50                                                | 10.0                                 | -12.2 | 10.0 | -13.7 | 10.0 | -16.9 | 10.0 | -18.7 | 10.0 | -20.5 | 10.0 | -24.4 | 10.0 | -26.4 | 10.6 | -28.6 | 12.3 | -33.2 | 13.1 | -35.6 | 14.1 | -38.1  | 18.1 | -48.9  |
|                         | 1    | 100                                               | 10.0                                 | -11.9 | 10.0 | -13.3 | 10.0 | -18.5 | 10.0 | -18.2 | 10.0 | -19.9 | 10.0 | -23.7 | 10.0 | -25.7 | 10.0 | -27.8 | 11.4 | -32.3 | 12.2 | -34.6 | 13.0 | -37.0  | 16.7 | -47.6  |
|                         | 2    | 10                                                | 10.0                                 | -21.8 | 10.0 | -24.4 | 10.0 | -30.2 | 10.0 | -33.3 | 10.0 | -36.5 | 10.5 | -43.5 | 11.4 | -47.2 | 12.4 | -51.0 | 14.3 | -59.2 | 15.4 | -63.5 | 16.5 | -67.9  | 21.1 | -87.2  |
|                         | 2    | 20                                                | 10.0                                 | -19.5 | 10.0 | -21.8 | 10.0 | -27.0 | 10.0 | -29.7 | 10.0 | -32.6 | 10.0 | -38.8 | 10.7 | -42.1 | 11.6 | -45.6 | 13.4 | -52.9 | 14.4 | -56.7 | 15.4 | -60.7  | 19.8 | -78.0  |
|                         | 2    | 50                                                | 10.0                                 | -16.4 | 10.0 | -18.4 | 10.0 | -22.7 | 10.0 | -25.1 | 10.0 | -27.5 | 10.0 | -32.7 | 10.0 | -35.5 | 10.6 | -38.4 | 12.3 | -44.5 | 13.1 | -47.8 | 14.1 | -51.1  | 18.1 | -65.7  |
|                         | 2    | 100                                               | 10.0                                 | -14.1 | 10.0 | -15.8 | 10.0 | -19.5 | 10.0 | -21.5 | 10.0 | -23.6 | 10.0 | -28.1 | 10.0 | -30.5 | 10.0 | -33.0 | 11.4 | -38.2 | 12.2 | -41.0 | 13.0 | -43.9  | 16.7 | -56.4  |
|                         | 3    | 10                                                | 10.0                                 | -32.8 | 10.0 | -36.8 | 10.0 | -45.4 | 10.0 | -50.1 | 10.0 | -55.0 | 10.5 | -65.4 | 11.4 | -71.0 | 12.4 | -76.8 | 14.3 | -89.0 | 15.4 | -95.5 | 16.5 | -102.2 | 21.1 | -131.3 |
|                         | 3    | 20                                                | 10.0                                 | -27.2 | 10.0 | -30.5 | 10.0 | -37.6 | 10.0 | -41.5 | 10.0 | -45.5 | 10.0 | -54.2 | 10.7 | -58.8 | 11.6 | -63.6 | 13.4 | -73.8 | 14.4 | -79.1 | 15.4 | -84.7  | 19.8 | -108.7 |
|                         | 3    | 50                                                | 10.0                                 | -19.7 | 10.0 | -22.1 | 10.0 | -27.3 | 10.0 | -30.1 | 10.0 | -33.1 | 10.0 | -39.3 | 10.0 | -42.7 | 10.6 | -46.2 | 12.3 | -53.5 | 13.1 | -57.4 | 14.1 | -61.5  | 18.1 | -78.9  |
|                         | 3    | 100                                               | 10.0                                 | -14.1 | 10.0 | -15.8 | 10.0 | -19.5 | 10.0 | -21.5 | 10.0 | -23.6 | 10.0 | -28.1 | 10.0 | -30.5 | 10.0 | -33.0 | 11.4 | -38.2 | 12.2 | -41.0 | 13.0 | -43.9  | 16.7 | -56.4  |
| Roof > 10 to 30 degrees | 1    | 10                                                | 10.0                                 | -11.9 | 10.0 | -13.3 | 10.4 | -16.5 | 11.4 | -18.2 | 12.5 | -19.9 | 14.9 | -23.7 | 16.2 | -25.7 | 17.5 | -27.8 | 20.3 | -32.3 | 21.8 | -34.6 | 23.3 | -37.0  | 30.0 | -47.6  |
|                         | 1    | 20                                                | 10.0                                 | -11.6 | 10.0 | -13.0 | 10.0 | -16.0 | 10.4 | -17.6 | 11.4 | -19.4 | 13.6 | -23.0 | 14.8 | -25.0 | 16.0 | -27.0 | 18.5 | -31.4 | 19.9 | -33.7 | 21.3 | -36.0  | 27.3 | -46.3  |
|                         | 1    | 50                                                | 10.0                                 | -11.1 | 10.0 | -12.5 | 10.0 | -15.4 | 10.0 | -17.0 | 10.0 | -18.6 | 11.9 | -22.2 | 12.9 | -24.1 | 13.9 | -26.0 | 16.1 | -30.2 | 17.3 | -32.4 | 18.5 | -34.6  | 23.8 | -44.5  |
|                         | 1    | 100                                               | 10.0                                 | -10.8 | 10.0 | -12.1 | 10.0 | -14.9 | 10.0 | -16.5 | 10.0 | -18.1 | 10.5 | -21.5 | 11.4 | -23.3 | 12.4 | -25.2 | 14.3 | -29.3 | 15.4 | -31.4 | 16.5 | -33.6  | 21.1 | -43.2  |
|                         | 2    | 10                                                | 10.0                                 | -25.1 | 10.0 | -28.2 | 10.4 | -34.8 | 11.4 | -38.3 | 12.5 | -42.1 | 14.9 | -50.1 | 16.2 | -54.3 | 17.5 | -58.7 | 20.3 | -68.1 | 21.8 | -73.1 | 23.3 | -78.2  | 30.0 | -100.5 |
|                         | 2    | 20                                                | 10.0                                 | -22.8 | 10.0 | -25.6 | 10.0 | -31.5 | 10.4 | -34.8 | 11.4 | -38.2 | 13.6 | -45.4 | 14.8 | -49.3 | 16.0 | -53.3 | 18.5 | -61.8 | 19.9 | -66.3 | 21.3 | -71.0  | 27.3 | -91.2  |
|                         | 2    | 50                                                | 10.0                                 | -19.7 | 10.0 | -22.1 | 10.0 | -27.3 | 10.0 | -30.1 | 10.0 | -33.0 | 11.9 | -39.3 | 12.9 | -42.7 | 13.9 | -46.1 | 16.1 | -53.5 | 17.3 | -57.4 | 18.5 | -61.4  | 23.8 | -78.9  |
|                         | 2    | 100                                               | 10.0                                 | -17.4 | 10.0 | -19.5 | 10.0 | -24.1 | 10.0 | -26.6 | 10.0 | -29.1 | 10.5 | -34.7 | 11.4 | -37.6 | 12.4 | -40.7 | 14.3 | -47.2 | 15.4 | -50.6 | 16.5 | -54.2  | 21.1 | -69.6  |
|                         | 3    | 10                                                | 10.0                                 | -25.1 | 10.0 | -28.2 | 10.4 | -34.8 | 11.4 | -38.3 | 12.5 | -42.1 | 14.9 | -50.1 | 16.2 | -54.3 | 17.5 | -58.7 | 20.3 | -68.1 | 21.8 | -73.1 | 23.3 | -78.2  | 30.0 | -100.5 |
|                         | 3    | 20                                                | 10.0                                 | -22.8 | 10.0 | -25.6 | 10.0 | -31.5 | 10.4 | -34.8 | 11.4 | -38.2 | 13.6 | -45.4 | 14.8 | -49.3 | 16.0 | -53.3 | 18.5 | -61.8 | 19.9 | -66.3 | 21.3 | -71.0  | 27.3 | -91.2  |
|                         | 3    | 50                                                | 10.0                                 | -19.7 | 10.0 | -22.1 | 10.0 | -27.3 | 10.0 | -30.1 | 10.0 | -33.0 | 11.9 | -39.3 | 12.9 | -42.7 | 13.9 | -46.1 | 16.1 | -53.5 | 17.3 | -57.4 | 18.5 | -61.4  | 23.8 | -78.9  |
|                         | 3    | 100                                               | 10.0                                 | -17.4 | 10.0 | -19.5 | 10.0 | -24.1 | 10.0 | -26.6 | 10.0 | -29.1 | 10.5 | -34.7 | 11.4 | -37.6 | 12.4 | -40.7 | 14.3 | -47.2 | 15.4 | -50.6 | 16.5 | -54.2  | 21.1 | -69.6  |
| Roof > 30 to 45 degrees | 1    | 10                                                | 11.9                                 | -13.0 | 13.3 | -14.6 | 16.5 | -18.0 | 18.2 | -19.8 | 19.9 | -21.8 | 23.7 | -25.9 | 25.7 | -28.1 | 27.8 | -30.4 | 32.3 | -35.3 | 34.6 | -37.8 | 37.0 | -40.5  | 47.6 | -52.0  |
|                         | 1    | 20                                                | 11.6                                 | -12.3 | 13.0 | -13.8 | 16.0 | -17.1 | 17.6 | -18.8 | 19.4 | -20.7 | 23.0 | -24.6 | 25.0 | -26.7 | 27.0 | -28.9 | 31.4 | -33.5 | 33.7 | -35.9 | 36.0 | -38.4  | 46.3 | -49.3  |
|                         | 1    | 50                                                | 11.1                                 | -11.5 | 12.5 | -12.8 | 15.4 | -15.9 | 17.0 | -17.5 | 18.6 | -19.2 | 22.2 | -22.8 | 24.1 | -24.8 | 26.0 | -25.8 | 30.2 | -31.1 | 32.4 | -33.3 | 34.6 | -35.7  | 44.5 | -45.8  |
|                         | 1    | 100                                               | 10.8                                 | -10.8 | 12.1 | -12.1 | 14.9 | -14.9 | 16.5 | -16.5 | 18.1 | -18.1 | 21.5 | -21.5 | 23.3 | -23.3 | 25.2 | -25.2 | 29.3 | -29.3 | 31.4 | -31.4 | 33.6 | -33.6  | 43.2 | -43.2  |
|                         | 2    | 10                                                | 11.9                                 | -15.2 | 13.3 | -17.0 | 16.5 | -21.0 | 18.2 | -23.2 | 19.9 | -25.5 | 23.7 | -30.3 | 25.7 | -32.9 | 27.8 | -35.6 | 32.3 | -41.2 | 34.6 | -44.2 | 37.0 | -47.3  | 47.6 | -60.8  |
|                         | 2    | 20                                                | 11.6                                 | -14.5 | 13.0 | -16.3 | 16.0 | -20.1 | 17.6 | -22.2 | 19.4 | -24.3 | 23.0 | -29.0 | 25.0 | -31.4 | 27.0 | -34.0 | 31.4 | -39.4 | 33.7 | -42.3 | 36.0 | -45.3  | 46.3 | -58.1  |
|                         | 2    | 50                                                | 11.1                                 | -13.7 | 12.5 | -15.3 | 15.4 | -18.9 | 17.0 | -20.8 | 18.6 | -22.9 | 22.2 | -27.2 | 24.1 | -29.5 | 26.0 | -32.0 | 30.2 | -37.1 | 32.4 | -39.8 | 34.6 | -42.5  | 44.5 | -54.6  |
|                         | 2    | 100                                               | 10.8                                 | -13.0 | 12.1 | -14.6 | 14.9 | -18.0 | 16.5 | -19.8 | 18.1 | -21.8 | 21.5 | -25.9 | 23.3 | -28.1 | 25.2 | -30.4 | 29.3 | -35.3 | 31.4 | -37.8 | 33.6 | -40.5  | 43.2 | -52.0  |
|                         | 3    | 10                                                | 11.9                                 | -15.2 | 13.3 | -17.0 | 16.5 | -21.0 | 18.2 | -23.2 | 19.9 | -25.5 | 23.7 | -30.3 | 25.7 | -32.9 | 27.8 | -35.6 | 32.3 | -41.2 | 34.6 | -44.2 | 37.0 | -47.3  | 47.6 | -60.8  |
|                         | 3    | 20                                                | 11.6                                 | -14.5 | 13.0 | -16.3 | 16.0 | -20.1 | 17.6 | -22.2 | 19.4 | -24.3 | 23.0 | -29.0 | 25.0 | -31.4 | 27.0 | -34.0 | 31.4 | -39.4 | 33.7 | -42.3 | 36.0 | -45.3  | 46.3 | -58.1  |
|                         | 3    | 50                                                | 11.1                                 | -13.7 | 12.5 | -15.3 | 15.4 | -18.9 | 17.0 | -20.8 | 18.6 | -22.9 | 22.2 | -27.2 | 24.1 | -29.5 | 26.0 | -32.0 | 30.2 | -37.1 | 32.4 | -39.8 | 34.6 | -42.5  | 44.5 | -54.5  |
|                         | 3    | 100                                               | 10.8                                 | -13.0 | 12.1 | -14.6 | 14.9 | -18.0 | 16.5 | -19.8 | 18.1 | -21.8 | 21.5 | -25.9 | 23.3 | -28.1 | 25.2 | -30.4 | 29.3 | -35.3 | 31.4 | -37.8 | 33.6 | -40.5  | 43.2 | -52.0  |
| Wall                    | 4    | 10                                                | 13.0                                 | -14.1 | 14.6 | -15.8 | 18.0 | -19.5 | 19.8 | -21.5 | 21.8 | -23.6 | 25.9 | -28.1 | 28.1 | -30.5 | 30.4 | -33.0 | 35.3 | -38.2 | 37.8 | -41.0 | 40.5 | -43.9  | 52.0 | -56.4  |
|                         | 4    | 20                                                | 12.4                                 | -13.5 | 13.9 | -15.1 | 17.2 | -18.7 | 18.9 | -20.6 | 20.8 | -22.6 | 24.7 | -26.9 | 26.8 | -29.2 | 29.0 | -31.6 | 33.7 | -36.7 | 36.1 | -39.3 | 38.7 | -42.1  | 49.6 | -54.1  |
|                         | 4    | 50                                                | 11.6                                 | -12.7 | 13.0 | -14.3 | 16.1 | -17.6 | 17.8 | -19.4 | 19.5 | -21.3 | 23.2 | -25.4 | 25.2 | -27.5 | 27.2 | -29.8 | 31.6 | -34.6 | 33.9 | -37.1 | 36.2 | -39.7  | 46.6 | -51.0  |
|                         | 4    | 100                                               | 11.1                                 | -12.2 | 12.4 | -13.6 | 15.3 | -16.8 | 16.9 | -18.5 | 18.5 | -20.4 | 22.0 | -24.2 | 23.9 | -26.3 | 25.9 | -28.4 | 30.0 | -33.0 | 32.2 | -35.4 | 34.4 | -37.8  | 44.2 | -48.6  |
|                         | 5    | 10                                                | 13.0                                 | -17.4 | 14.6 | -19.5 | 18.0 | -24.1 | 19.8 | -26.6 | 21.8 | -29.1 | 25.9 | -34.7 | 28.1 | -37.6 | 30.4 | -40.7 | 35.3 | -47.2 | 37.8 | -50.6 | 40.5 | -54.2  | 52.0 | -69.6  |
|                         | 5    | 20                                                | 12.4                                 | -16.2 | 13.9 | -18.2 | 17.2 | -22.5 | 18.9 | -24.8 | 20.8 | -27.2 | 24.7 | -32.4 | 26.8 | -35.1 | 29.0 | -38.0 | 33.7 | -44.0 | 36.1 | -47.2 | 38.7 | -50.5  | 49.6 | -64.9  |
|                         | 5    | 50                                                | 11.6                                 | -14.7 | 13.0 | -16.5 | 16.1 | -20.3 | 17.8 | -22.4 | 19.5 | -24.6 | 23.2 | -29.3 | 25.2 | -31.8 | 27.2 | -34.3 | 31.6 | -39.8 | 33.9 | -42.7 | 36.2 | -45.7  | 46.6 | -58.7  |
|                         | 5    | 100                                               | 11.1                                 | -13.5 | 12.4 | -15.1 | 15.3 | -18.7 | 16.9 | -20.6 | 18.5 | -22.6 | 22.0 | -26.9 | 23.9 | -29.2 | 25.9 | -31.6 | 30.0 | -36.7 | 32.2 | -39.3 | 34.4 | -42.1  | 44.2 | -54.1  |

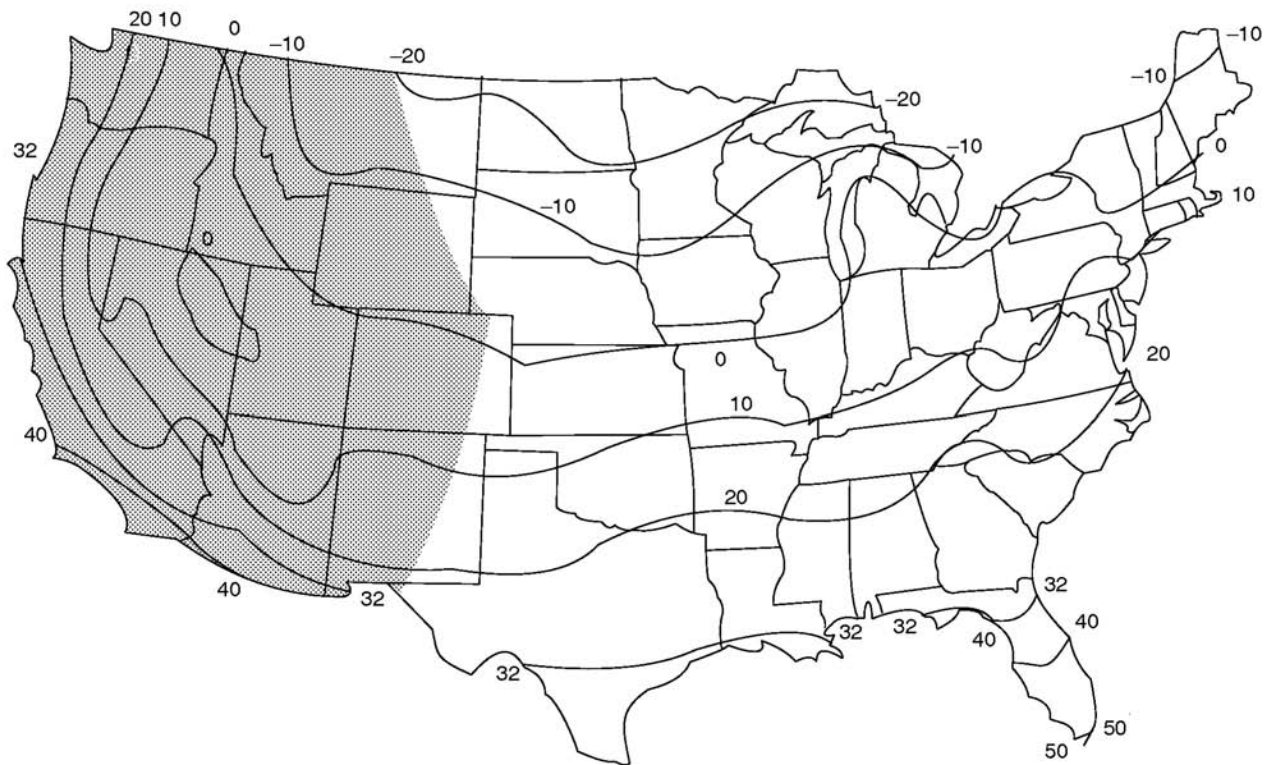
For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m<sup>2</sup>, 1 mile per hour = 0.447 m/s, 1 pound per square foot = 0.0479 kPa.

**Notes:**

- The effective wind area shall be equal to the span length multiplied by an effective width. This width shall be permitted to be not be less than one-third the span length. For cladding fasteners, the effective wind area shall not be greater than the area that is tributary to an individual fastener.
- For effective areas between those given above, the load may be interpolated; otherwise, use the load associated with the lower effective area.
- Table values shall be adjusted for height and exposure by multiplying by the adjustment coefficient in Table R301.2(3).
- See Figure R301.2(7) for location of zones.
- Plus and minus signs signify pressures acting toward and away from the building surfaces.

**TABLE R301.2(3)**  
**HEIGHT AND EXPOSURE ADJUSTMENT COEFFICIENTS FOR TABLE R301.2(2)**

| MEAN<br>ROOF HEIGHT | EXPOSURE |      |      |
|---------------------|----------|------|------|
|                     | B        | C    | D    |
| 15                  | 1.00     | 1.21 | 1.47 |
| 20                  | 1.00     | 1.29 | 1.55 |
| 25                  | 1.00     | 1.35 | 1.61 |
| 30                  | 1.00     | 1.40 | 1.66 |
| 35                  | 1.05     | 1.45 | 1.70 |
| 40                  | 1.09     | 1.49 | 1.74 |
| 45                  | 1.12     | 1.53 | 1.78 |
| 50                  | 1.16     | 1.56 | 1.81 |
| 55                  | 1.19     | 1.59 | 1.84 |
| 60                  | 1.22     | 1.62 | 1.87 |



 DESIGN TEMPERATURES IN THIS AREA MUST BE BASED ON ANALYSIS OF LOCAL CLIMATE AND TOPOGRAPHY

For SI:  $^{\circ}\text{C} = [(^{\circ}\text{F}) - 32] / 1.8$ .

**FIGURE R301.2(1)**  
**ISOLINES OF THE 97<sup>1</sup>/<sub>2</sub> PERCENT WINTER (DECEMBER, JANUARY AND FEBRUARY) DESIGN TEMPERATURES ( $^{\circ}\text{F}$ )**

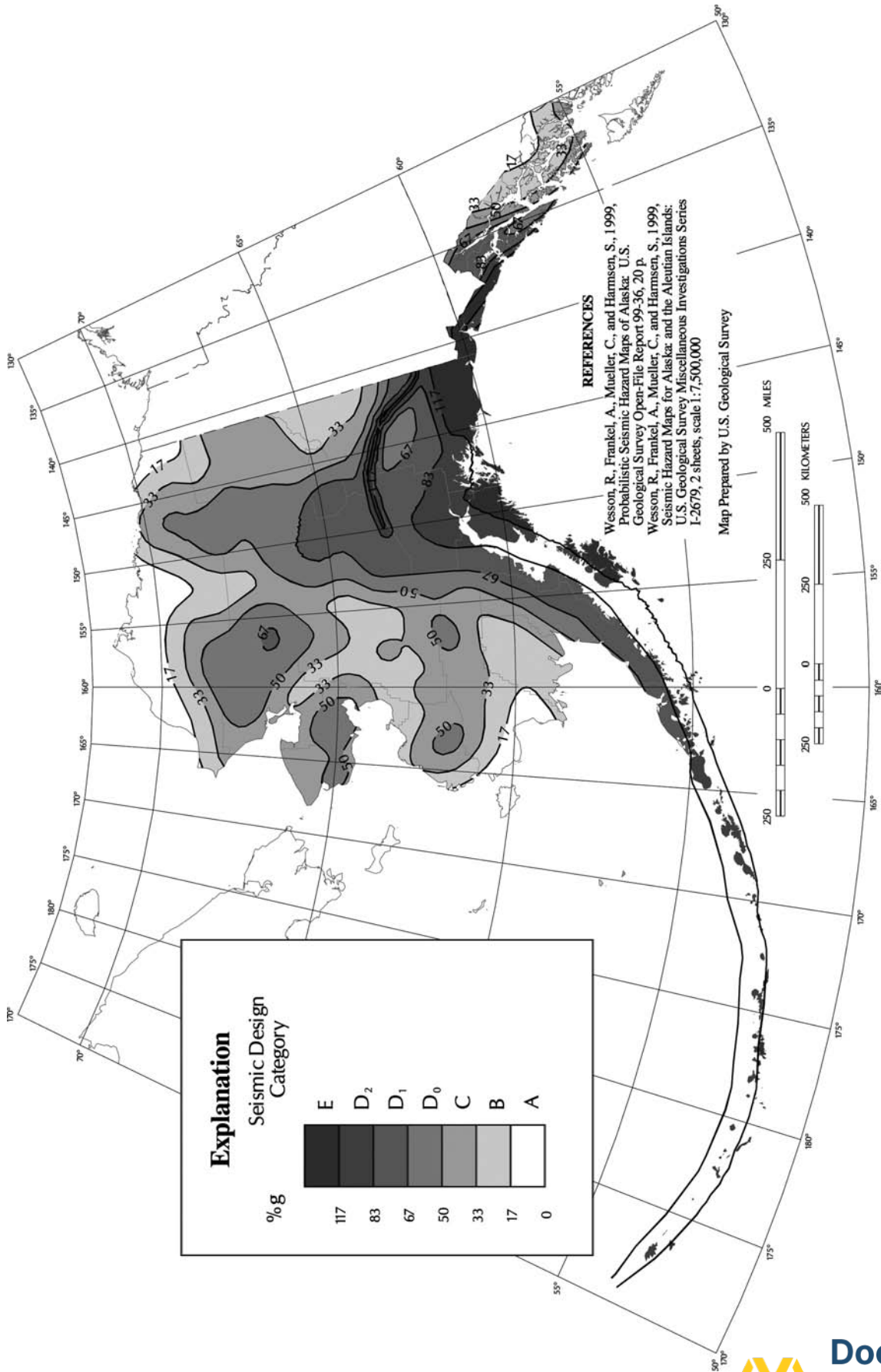


FIGURE R301.2(2)  
SEISMIC DESIGN CATEGORIES—SITE CLASS D  
(continued)